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SYSMAC CJ Series

CJ2H-CPU□□-EIP

CJ2 CPU Unit Hardware

USER'S MANUAL

OMRON

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SYSMAC CJ Series
CJ2H-CPU□□-EIP
CJ2 CPU Unit Hardware

User's Manual

Produced July 2008

Introduction

Thank you for purchasing a CJ2H-CPU□□-EIP CJ-series CPU Unit. This manual contains information that is necessary to use the CJ2H-CPU□□-EIP. Please thoroughly read and understand this manual before you use the CJ2H-CPU□□-EIP.

Intended Audience

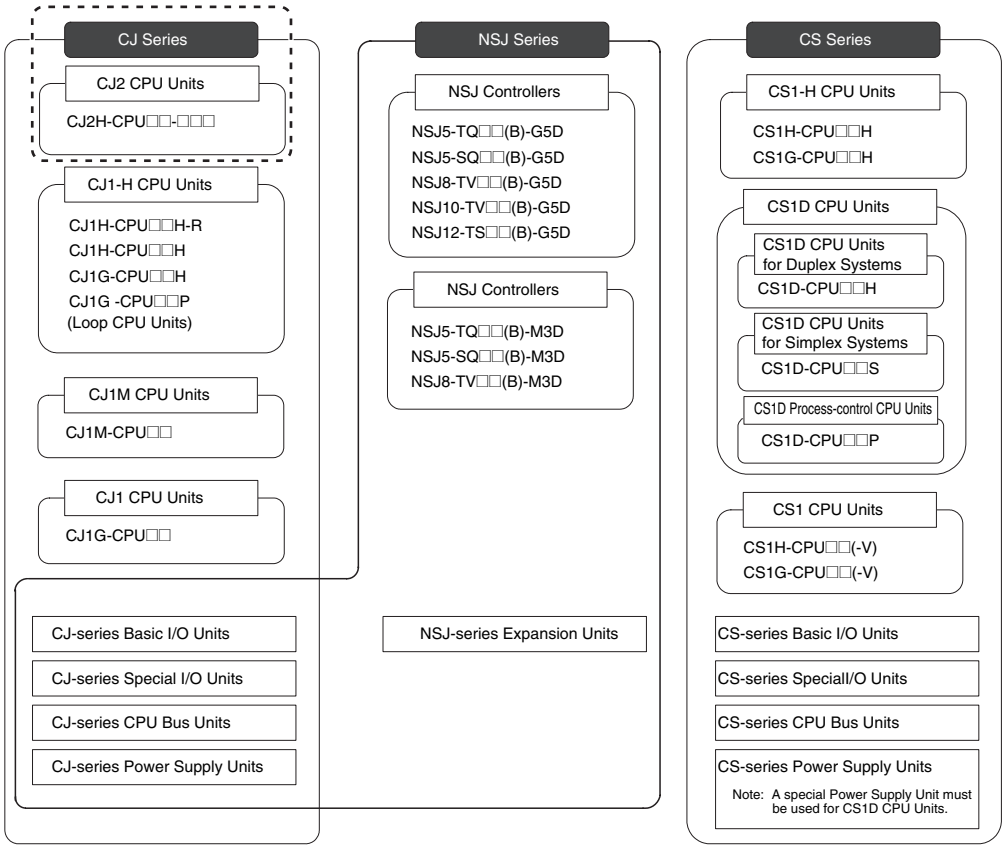
This manual is intended for the following personnel, who must also have knowledge of electrical systems (an electrical engineer or the equivalent).

- Personnel in charge of installing FA systems
- Personnel in charge of designing FA systems.
- Personnel in charge of managing FA systems and facilities.

Applicable Products

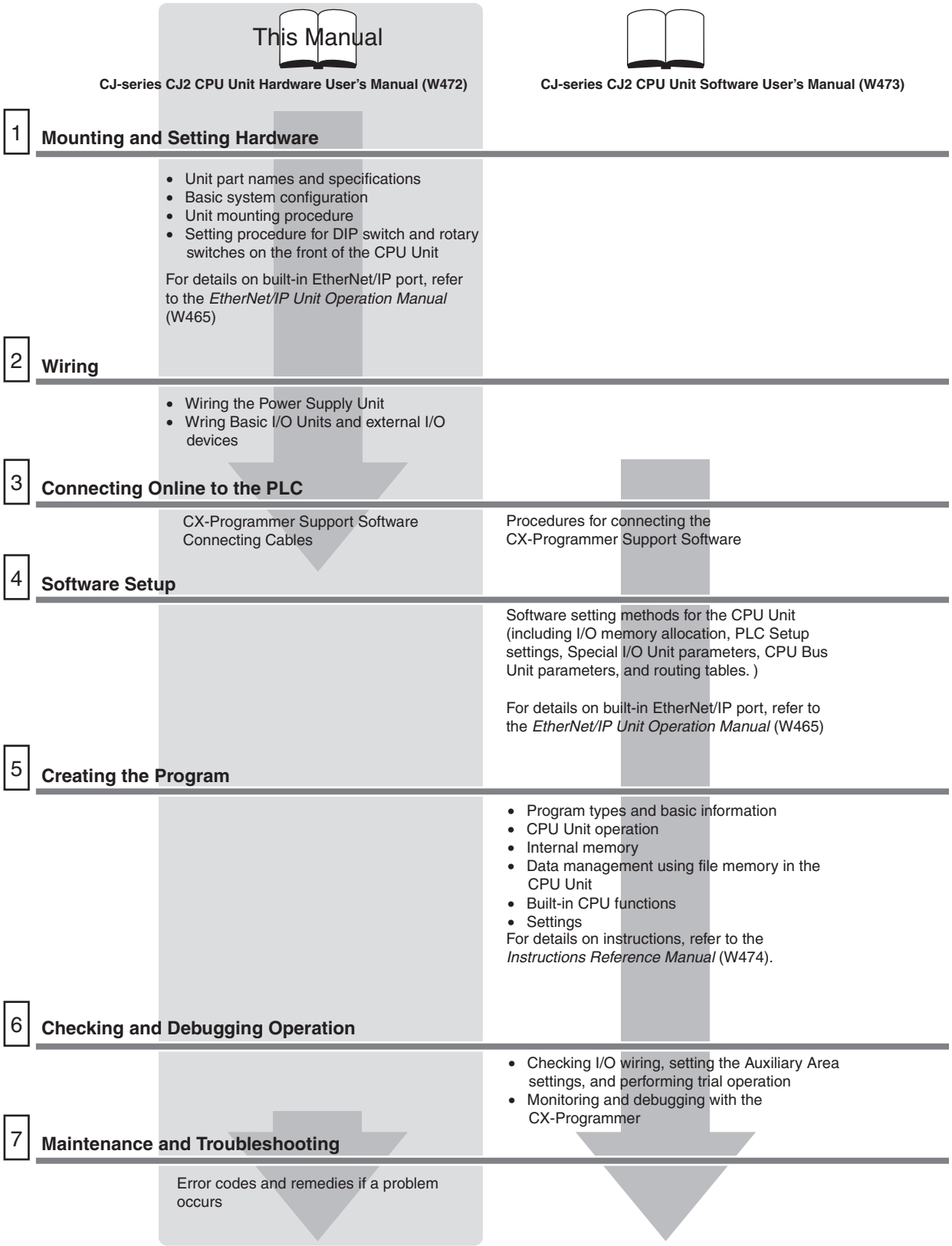
● Definition of CJ Series

In this manual, CJ Series is a general term to refer to the CJ2 CPU Units, CJ1-H CPU Units, CJ1M CPU Units, and CJ1 CPU Units.



CJ2 CPU Unit Manuals

Information on the CJ2 CPU Units is provided in the following manuals. Refer to the appropriate manual for the information that is required.


This Manual
CJ-series CJ2 CPU Unit Hardware User's Manual (W472)
CJ-series CJ2 CPU Unit Software User's Manual (W473)
1 Mounting and Setting Hardware
• Unit part names and specifications
• Basic system configuration
• Unit mounting procedure
• Setting procedure for DIP switch and rotary switches on the front of the CPU Unit
For details on built-in EtherNet/IP port, refer to the EtherNet/IP Unit Operation Manual (W465)
2 Wiring
• Wiring the Power Supply Unit
• Wring Basic I/O Units and external I/O devices
3 Connecting Online to the PLC
CX-Programmer Support Software
Connecting Cables
Procedures for connecting the CX-Programmer Support Software
4 Software Setup
Software setting methods for the CPU Unit (including I/O memory allocation, PLC Setup settings, Special I/O Unit parameters, CPU Bus Unit parameters, and routing tables.)
For details on built-in EtherNet/IP port, refer to the EtherNet/IP Unit Operation Manual (W465)
5 Creating the Program
• Program types and basic information
• CPU Unit operation
• Internal memory
• Data management using file memory in the CPU Unit
• Built-in CPU functions
• Settings
For details on instructions, refer to the Instructions Reference Manual (W474).
6 Checking and Debugging Operation
• Checking I/O wiring, setting the Auxiliary Area settings, and performing trial operation
• Monitoring and debugging with the CX-Programmer
7 Maintenance and Troubleshooting
Error codes and remedies if a problem occurs

Manual Configuration

The CJ2 CPU manuals are organized in the sections listed in the following tables. Refer to the appropriate section in the manuals as required.

Hardware User's Manual (W472) (This Manual)

Section	Content
Section 1 Overview	This section gives an overview of the CJ2 CPU Units and describes the features and specifications.
Section 2 Basic System Configuration and Devices	This section describes the system configuration for the CJ2 CPU Unit.
Section 3 Nomenclature and Functions	This section describes the part names and functions of the CPU Unit and Configuration Units.
Section 4 Support Software	This section describes the types of Support Software to use to perform programming and debugging and how to connect the PLC to the Support Software.
Section 5 Installation	This section describes the installation locations and how to wire CPU Units and Configuration Units.
Section 6 Troubleshooting	This section describes how to check the status for errors that occur during system operation and the remedies for those errors.
Section 7 Inspection and Maintenance	This section describes periodic inspection, the service lifes of the Battery and Power Supply Unit, and how to replace the Battery.
Section 8 Backup Operations	This section describes the procedure to back up PLC data.
Appendices	The appendices provide Unit dimensions, details on fatal and non-fatal errors, information on connecting to serial ports on the CPU Unit, the procedure for installing the USB driver on a computer, and information on load short-circuit protection and line disconnection detection.

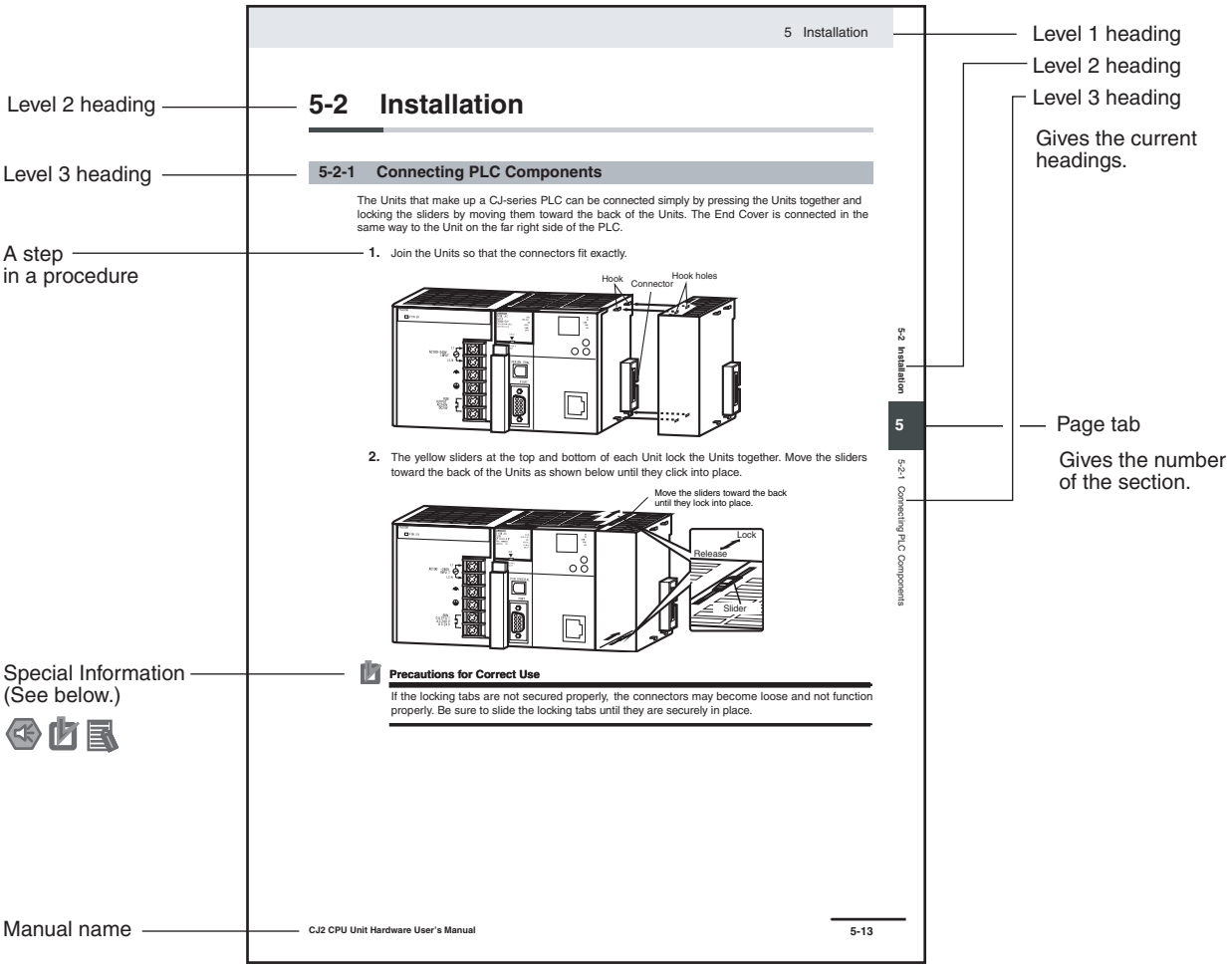
Software User's Manual (W473)

Section	Content
Section 1 Overview	This section gives an overview of the CJ2 CPU Units and describes the features and specifications.
Section 2 Internal Memory in the CPU Unit	This section describes the types of memory in the CPU Unit and the data that is stored.
Section 3 CPU Unit Operation	This section describes the internal operation of the CPU Unit.
Section 4 CPU Unit Initialization	This section describes the initial setup of the CPU Unit.
Section 5 Understanding Programming	This section describes program types and programming details, such as symbols and programming instructions.
Section 6 I/O Memory Areas	This section describes the I/O memory areas in the CPU Unit.
Section 7 File Operations	This section describes the files that can be stored in the CPU Unit, the storage destination for those files, and file operations.
Section 8 I/O Allocations and Unit Settings	This section describes the I/O allocations used to exchange data between the CPU Unit and other Units.
Section 9 PLC Setup	This section describes details on the PLC Setup settings, which are used to perform basic settings for the CPU Unit.
Section 10 CPU Unit Functions	This section describes functions that are built into the CPU Unit.
Section 11 Programming Devices and Communications	This section describes the procedure for connecting the CJ2 CPU Unit to the CX-Programmer or other Support Software and to other devices.
Section 12 CPU Unit Cycle Time	This section describes how to monitor and calculate the cycle time.
Appendices	The appendices provide information on programming instructions, execution times, number of steps, Auxiliary Area words and bits, a memory map of the continuous PLC memory addresses, I/O memory operation when power is interrupted, and a comparison of CJ-series and CS-series PLCs.

Manual Structure

Page Structure

The following page structure is used in this manual.


5 Installation
Level 1 heading
Level 2 heading
Level 3 heading
Gives the current headings.
Level 2 heading
5-2 Installation
Level 3 heading
5-2-1 Connecting PLC Components
The Units that make up a CJ-series PLC can be connected simply by pressing the Units together and locking the sliders by moving them toward the back of the Units. The End Cover is connected in the same way to the Unit on the far right side of the PLC.
A step in a procedure
1. Join the Units so that the connectors fit exactly.
Hook
Connector
Hook holes
2. The yellow sliders at the top and bottom of each Unit lock the Units together. Move the sliders toward the back of the Units as shown below until they click into place.
Move the sliders toward the back until they lock into place.
Lock
Release
Slider
5-2 Installation
5
5-2-1 Connecting PLC Components
Page tab
Gives the number of the section.
Special Information (See below.)
Precautions for Correct Use
If the locking tabs are not secured properly, the connectors may become loose and not function properly. Be sure to slide the locking tabs until they are securely in place.
Manual name
CJ2 CPU Unit Hardware User's Manual
5-13

This illustration is provided only as a sample and may not literally appear in this manual.

Special Information

Special information in this manual is classified as follows:

Precautions for Safe Use

Precautions on what to do and what not to do to ensure using the product safely.

Precautions for Correct Use

Precautions on what to do and what not to do to ensure proper operation and performance.

Additional Information

Additional information to increase understanding or make operation easier.

Sections in this Manual

1 Overview

2 Basic System Configuration and Devices

3 Nomenclature and Functions

4 Support Software

5 Installation

6 Troubleshooting

7 Inspection and Maintenance

8 Backup Operations

A Appendices

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Read and Understand this Manual

Please read and understand this manual before using the product. Please consult your OMRON representative if you have any questions or comments.

Warranty and Limitations of Liability

WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

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In no event shall the responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.

IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED, AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE, OR INAPPROPRIATE MODIFICATION OR REPAIR.

Application Considerations

SUITABILITY FOR USE

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the products.

At the customer's request, OMRON will provide applicable third party certification documents identifying ratings and limitations of use that apply to the products. This information by itself is not sufficient for a complete determination of the suitability of the products in combination with the end product, machine, system, or other application or use.

The following are some examples of applications for which particular attention must be given. This is not intended to be an exhaustive list of all possible uses of the products, nor is it intended to imply that the uses listed may be suitable for the products:

- Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this manual.
- Nuclear energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
- Systems, machines, and equipment that could present a risk to life or property.

Please know and observe all prohibitions of use applicable to the products.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCTS ARE PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

PROGRAMMABLE PRODUCTS

OMRON shall not be responsible for the user's programming of a programmable product, or any consequence thereof.

Disclaimers

CHANGE IN SPECIFICATIONS

Product specifications and accessories may be changed at any time based on improvements and other reasons.

It is our practice to change model numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the products may be changed without any notice. When in doubt, special model numbers may be assigned to fix or establish key specifications for your application on your request. Please consult with your OMRON representative at any time to confirm actual specifications of purchased products.

DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

PERFORMANCE DATA

Performance data given in this manual is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of OMRON's test conditions, and the users must correlate it to actual application requirements. Actual performance is subject to the OMRON Warranty and Limitations of Liability.

ERRORS AND OMISSIONS

The information in this manual has been carefully checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical, or proofreading errors, or omissions.

Safety Precautions

Definition of Precautionary Information

The following notation is used in this manual to provide precautions required to ensure safe usage of a CJ-series PLC. The safety precautions that are provided are extremely important to safety. Always read and heed the information provided in all safety precautions.

WARINING	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. Additionally, there may be severe property damage.
Caution	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury, or property damage.



Precautions for Safe Use

Indicates precautions on what to do and what not to do to ensure using the product safely.



Precautions for Correct Use

Indicates precautions on what to do and what not to do to ensure proper operation and performance.

Symbols



The triangle symbol indicates precautions (including warnings). The specific operation is shown in the triangle and explained in text. This example indicates a precaution for electric shock.



The circle and slash symbol indicates operations that you must not do. The specific operation is shown in the circle and explained in text. This example indicates “do not disassemble.”



The filled circle symbol indicates operations that you must do. The specific operation is shown in the circle and explained in text. This example shows a general precaution for something that you must do.



The triangle symbol indicates precautions (including warnings). The specific operation is shown in the triangle and explained in text. This example indicates a general precaution.



The triangle symbol indicates precautions (including warnings). The specific operation is shown in the triangle and explained in text. This example indicates a precaution for hot surfaces.

⚠ WARNING

Do not attempt to take any Unit apart while the power is being supplied. Doing so may result in electric shock.



Do not touch any of the terminals or terminal blocks while the power is being supplied. Doing so may result in electric shock.



Provide safety measures in external circuits (i.e., not in the Programmable Controller), including the following items, to ensure safety in the system if an abnormality occurs due to malfunction of the PLC or another external factor affecting the PLC operation. Not doing so may result in serious accidents.



- Emergency stop circuits, interlock circuits, limit circuits, and similar safety measures must be provided in external control circuits.
- The PLC will turn OFF all outputs when its self-diagnosis function detects any error or when a severe failure alarm (FALS) instruction is executed. As a countermeasure for such errors, external safety measures must be provided to ensure safety in the system.
- The PLC outputs may remain ON or OFF due to deposition or burning of the output relays or destruction of the output transistors. As a countermeasure for such problems, external safety measures must be provided to ensure safety in the system.
- When the 24-VDC output (service power supply to the PLC) is overloaded or short-circuited, the voltage may drop and result in the outputs being turned OFF. As a countermeasure for such problems, external safety measures must be provided to ensure safety in the system.

Confirm safety before transferring data files stored in the file memory (Memory Card or EM file memory) to the I/O area (CIO) of the CPU Unit using a peripheral tool. Otherwise, the devices connected to the output unit may malfunction regardless of the operation mode of the CPU Unit.



Fail-safe measures must be taken by the customer to ensure safety in the event of incorrect, missing, or abnormal signals caused by broken signal lines, momentary power interruptions, or other causes. Serious accidents may result from abnormal operation if proper measures are not provided.



⚠ WARNING

When restoring data, carefully check that the selected data is the correct data to be restored before executing the restore operation. Depending on the contents of the selected data, the control system may operate unexpectedly after the data is restored.



Some Special I/O Units and CPU Bus Units operate with parameters stored in the CPU Unit (e.g., words allocated in DM Area, data link tables, or Ethernet settings). Information on restrictions will be displayed in the Information Area in the PLC Backup Tool if there are any restrictions for the selected CPU Bus Unit or Special I/O Unit. Check the restrictions, and then be sure to select both the CPU Unit and the CPU Bus Unit or Special I/O Unit when backing up or restoring data. The control system may operate unexpectedly if the equipment is started with the data backed up or restored without selecting both Units.



Information on restrictions will be displayed in the Information Area in the PLC Backup Tool if the data to be stored includes a Unit that has restrictions on backup. Check the information on restrictions and take the required countermeasures. The control system may operate unexpectedly when the equipment is operated after the data is restored



Before restoring data during PLC operation, be sure that there will be no problem if PLC operation stops. If the PLC stops at an unexpected time, the control system may operate unexpectedly.



Be sure to turn the PLC power supply OFF and then back ON after restoring data. If the power is not reset, the system may not be updated with the restored data, and the control system may operate unexpectedly.



Data on forced status can be backed up but it cannot be restored. Perform the procedure to force-set or force-reset bits from the CX-Programmer as required before starting operation after restoring data that includes forced status. Depending on the difference in the forced status, the control system may operate unexpectedly.



⚠ Caution

Execute online edit only after confirming that no adverse effects will be caused by extending the cycle time. Otherwise, the input signals may not be readable.



Confirm safety at the destination node before transferring a program to another node or changing contents of the I/O memory area. Doing either of these without confirming safety may result in injury.



The CJ2 CPU Units automatically back up the user program and parameter data to flash memory when these are written to the CPU Unit. I/O memory including the DM, EM, and Holding Areas), however, is not written to flash memory.

The DM, EM, and Holding Areas can be held during power interruptions with a battery. If there is a battery error, the contents of these areas may not be accurate after a power interruption. If the contents of the DM, EM, and Holding Areas are used to control external outputs, prevent inappropriate outputs from being made whenever the Battery Error Flag (A402.04) is ON.



Tighten the screws on the terminal block of the AC Power Supply Unit to the torque specified in the user's manual. The loose screws may result in burning or malfunction.



Do not touch the Power Supply Unit when power is being supplied or immediately after the power supply is turned OFF. The Power Supply Unit will be hot and you may be burned.



Be careful when connecting personal computers or other peripheral devices to a PLC to which is mounted a non-insulated Unit (CS1W-CLK1□/5□(-V1) or CS1W-ETN01) connected to an external power supply. A short-circuit will be created if the 24 V side of the external power supply is grounded and the 0 V side of the peripheral device is grounded. When connecting a peripheral device to this type of PLC, either ground the 0 V side of the external power supply or do not ground the external power supply at all.



⚠ Caution



If a symbol or memory address (only symbols are allowed for ST programming) is specified for the suffix of an array variable in ladder or ST programming, be sure that the specified element number does not exceed the maximum memory area range. For example, write the program so that processing is executed only when the indirect specification is within the memory area range by using a symbol comparison instructions or an IF statement.

Specifying an element number that exceeds the maximum range of the memory area specified for the symbol will result accessing data in a different memory area, and may result in unexpected operation.

If a symbol or address is specified for an offset in a ladder diagram, program so that the memory area of the start address is not exceeded when the offset is specified indirectly using a word address or symbol. For example, write the program so that processing is executed only when the indirect specification does not cause the final address to exceed the memory area by using an input comparison instruction or other instruction.

If a indirect specification causes the address to exceed the area of the start address, the system will access data in other area, and unexpected operation may occur.

Application Precautions

Observe the following precautions when using a CJ-series PLC.

Power Supply

- Always use the power supply voltages specified in the user's manuals. An incorrect voltage may result in malfunction or burning.
- Exceeding the capacity of the Power Supply Unit may prevent the CPU Unit or other Units from starting.
- Take appropriate measures to ensure that the specified power with the rated voltage and frequency is supplied. Be particularly careful in places where the power supply is unstable. An incorrect power supply may result in malfunction.
- Always turn OFF the power supply to the PLC before attempting any of the following. Not turning OFF the power supply may result in malfunction or electric shock.
  - Mounting or dismounting Power Supply Units, I/O Units, CPU Units, or any other Units.
  - Assembling the Units.
  - Setting DIP switches or rotary switches.
  - Connecting cables or wiring the system.
  - Connecting or disconnecting the connectors.
- When cross-wiring terminals, the total current for all the terminal will flow in the wire. Make sure that the current capacity of the wire is sufficient.
- Observe the following precautions when using a Power Supply Unit that supports the Replacement Notification Function.
  - Replace the Power Supply Unit within six months if the display on the front of the Power Supply Unit alternates between 0.0 and A02, or if the alarm output automatically turns OFF.
  - Keep the alarm output cable separated from power line and high-voltage lines.
  - Do not apply a voltage or connect a load exceeding the specifications to the alarm output.
  - Whe storing the Power Supply Unit for more than three months, store it at –20 to 30°C and 25% to 70% humidity to preserve the Replacement Notification Function.
  - If the Power Supply Unit is not installed properly, heat buildup may cause the replacement notification signal to appear at the wrong time or may cause interior elements to deteriorate or become damaged. Use only the standard installation method.
- Do not touch the terminals on the Power Supply Unit immediately after turning OFF the power supply. Residual voltage may cause electrical shock.
- Observe the following precautions to prevent failure due to difference in electrical potential if the computer is connected to the PLC.
  - Before connecting a laptop computer to the PLC, disconnect the power supply plug of the computer from the AC outlet. Residual current in the AC adaptor may cause difference in electrical potential to occur between the computer and the PLC. After you connect the computer and PLC, supply the power again from the AC adaptor.
  - If the computer has a FG terminal, make the connections so that it has the same electrical potential as the FG (GR) terminal on the PLC.
- If the computer is grounded to a separate location, difference in electrical potential may occur depending on the grounding conditions.

Installation

- Do not install the PLC near sources of strong high-frequency noise.
- Before touching a Unit, be sure to first touch a grounded metallic object in order to discharge any static build-up. Not doing so may result in malfunction or damage.

- Be sure that the connectors, terminal blocks, expansion cables, and other items with locking devices are properly locked into place. Improper locking may result in malfunction.
- The sliders on the tops and bottoms of the Power Supply Unit, CPU Unit, I/O Units, Special I/O Units, and CPU Bus Units must be completely locked (until they click into place) after connecting to adjacent Units. The Unit may not operate properly if the sliders are not locked in place. It may not be possible to achieve proper functionality if the sliders are not locked.
- Always attach the End Cover that comes with the CPU Unit to the right end of the CPU Rack. The PLC will not operate correctly if the End Cover is not attached.

● Wiring

- Wire all connections correctly.
- Double-check all wiring and switch settings before turning ON the power supply. Incorrect wiring may result in burning.
- Be sure that all terminal screws, and cable connector screws are tightened to the torque specified in the relevant manuals. Incorrect tightening torque may result in malfunction.
- Do not apply a force exceeding 100 N to the terminal block when tightening it.
- Mount Units only after checking terminal blocks and connectors completely.
- Leave the label attached to the Unit when wiring. Removing the label may result in malfunction if foreign matter enters the Unit.
- Remove the label after the completion of wiring to ensure proper heat dissipation. Leaving the label attached may result in malfunction.
- Use crimp terminals for wiring. Do not connect bare stranded wires directly to terminals. Connection of bare stranded wires may result in burning.
- Do not apply voltages to the Input Units in excess of the rated input voltage. Excess voltages may result in burning.
- Always connect to a ground of 100 Ω or less when installing the Units. Not connecting to a ground of 100 Ω or less may result in electric shock.
- A ground of 100 Ω or less must be installed when shorting the GR and LG terminals on the Power Supply Unit.
- Fail-safe measures must be taken by the customer to ensure safety in the event of incorrect, missing, or abnormal signals caused by broken signal lines, momentary power interruptions, or other causes.
- Do not apply voltages or connect loads to the Output Units in excess of the maximum switching capacity. Excess voltage or loads may result in burning.
- Do not pull on the cables or bend the cables beyond their natural limit. Doing either of these may break the cables.
- Do not place objects on top of the cables or other wiring lines. Doing so may break the cables.
- Do not use commercially available RS-232C personal computer cables. Always use the special cables listed in this manual or make cables according to manual specifications. Using commercially available cables may damage the external devices or CPU Unit.
- Never connect pin 6 (5-V power supply) on the RS-232C port on the CPU Unit to any device other than an NT-AL001 or CJ1W-CIF11 Adapter. The external device or the CPU Unit may be damaged.

● Handling

- The Power Supply Unit may possibly be damaged if the entire voltage for a dielectric strength test is applied or shut OFF suddenly using a switch. Use a variable resistor to gradually increase and decrease the voltage.
- Separate the line ground terminal (LG) from the functional ground terminal (GR) on the Power Supply Unit before performing withstand voltage tests or insulation resistance tests. Not doing so may result in burning.
- Make sure that the DIP switches and DM Area are set correctly before starting operation.

- Make sure that the required data for the DM Area, Holding Area, and other memory areas has been transferred to a CPU Unit that has been replaced before restarting operation.
- Confirm that no adverse effect will occur in the system before attempting any of the following. Not doing so may result in an unexpected operation.
  - Changing the operating mode of the PLC (including the setting of the startup operating mode).
  - Force-setting/force-resetting any bit in memory.
  - Changing the present value of any word or any set value in memory.
- Do not attempt to disassemble, repair, or modify any Units. Any attempt to do so may result in malfunction, fire, or electric shock.
- Do not drop the PLC or subject abnormal vibration or shock to it.
- When replacing parts, be sure to confirm that the rating of a new part is correct. Not doing so may result in malfunction or burning.
- When transporting or storing Units or Board, static electricity can destroy LSIs or ICs. Cover the PCBs with a conductive material and maintain the specified storage temperature.
- Do not touch circuit boards or the components mounted to them with your bare hands. There are sharp leads and other parts on the boards that may cause injury if handled improperly.
- The life of the battery will be reduced if a CPU Unit is left for a period of time without a battery installed and without power supply, and then a battery is installed without turning ON the power supply.
- Before replacing the battery, turn ON power for at least 5 minutes before starting the replacement procedure and complete replacing the battery within 5 minutes of turning OFF the power supply. Memory contents may be corrupted if this precaution is not obeyed.
- If the Battery Error Flag is used in programming the application, confirm system safety even if the system detects a battery error before you replace the battery while the power is ON.
- Do not short the battery terminals or charge, disassemble, heat, or incinerate the battery. Do not subject the battery to strong shocks. Doing any of these may result in leakage, rupture, heat generation, or ignition of the battery. Dispose of any battery that has been dropped on the floor or otherwise subjected to excessive shock. Batteries that have been subjected to shock may leak if they are used.
- UL standards require that only an experienced engineer can replace the battery. Make sure that an experienced engineer is in charge of battery replacement. Follow the procedure for battery replacement given in this manual.



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- Unexpected operation may result if inappropriate data link tables or parameters are set. Even if appropriate data link tables and parameters have been set, confirm that the controlled system will not be adversely affected before starting or stopping data links.
- CPU Bus Units will be restarted when routing tables are transferred from a Programming Device to the CPU Unit. Restarting these Units is required to read and enable the new routing tables. Confirm that the system will not be adversely affected before allowing the CPU Bus Units to be reset.
  - When creating an AUTOEXEC.IOM file from a Programming Device (a Programming Console or the CX-Programmer) to automatically transfer data at startup, set the first write address to D20000 and be sure that the size of data written does not exceed the size of the DM Area. When the data file is read from the Memory Card at startup, data will be written in the CPU Unit starting at D20000 even if another address was set when the AUTOEXEC.IOM file was created. Also, if the DM Area is exceeded (which is possible when the CX-Programmer is used), the remaining data will be written to the EM Area.
- A battery is mounted to a CJ-series CPU Unit when the Unit is shipped from the factory. Also, the time is set on the internal clock. It is thus not necessary to clear memory and set the clock before using a CJ-series CPU Unit. This point differs from the CS-series CS1 CPU Units.

- The user program and parameter area data in the CJ2 CPU Units are backed up in the built-in flash memory. The BKUP indicator will light on the front of the CPU Unit when the backup operation is in progress. Do not turn OFF the power supply to the CPU Unit when the BKUP indicator is lit. The data will not be backed up if power is turned OFF.
- Check the user program and Unit parameter settings for proper execution before actually running them on the Unit. Not checking the program and parameter settings may result in an unexpected operation.
- When setting a Special I/O Unit or CPU Bus Unit in the I/O tables, carefully check the safety of the devices at the connection target before restarting the Unit.
- A CS1 or CJ1 CPU Unit program file (.OBJ) cannot be transferred directly to a CJ2 CPU Unit using a Memory Card. It must first be converted for use with a CJ2 CPU Unit using the CX-Programmer.

● External Circuits

- Interlock circuits, limit circuits, and similar safety measures in external circuits (i.e., not in the Programmable Controller) must be provided by the customer.
- Always turn ON power to the PLC before turning ON power to the control system. If the PLC power supply is turned ON after the control power supply, temporary errors may result in control system signals because the output terminals on DC Output Units and other Units will momentarily turn ON when power is turned ON to the PLC.
- Fail-safe measures must be taken by the customer to ensure safety in the event that outputs from Output Units remain ON as a result of internal circuit failures, which can occur in relays, transistors, and other elements.
- If the I/O Hold Bit is turned ON, the outputs from the PLC will not be turned OFF and will maintain their previous status when the PLC is switched from RUN or MONITOR mode to PROGRAM mode. Make sure that the external loads will not produce dangerous conditions when this occurs. (When operation stops for a fatal error, including those produced with the FALS(007) instruction, all outputs from Output Unit will be turned OFF and only the internal output status will be maintained.)
- Install external breakers and take other safety measures against short-circuiting in external wiring. Insufficient safety measures against short-circuiting may result in burning.
- Dispose of the product and batteries according to local ordinances as they apply.
- Do not turn OFF the power supply to the PLC when reading or writing a Memory Card. Also, do not remove the Memory Card when the BUSY indicator is lit. Doing so may make the Memory Card unusable.
- To remove a Memory Card, first press the memory card power supply switch and then wait for the BUSY indicator to go out before removing the Memory Card.

Operating Environment Precautions

- Follow the instructions in this manual to correctly perform installation.

- Do not operate the control system in the following locations:
  - Locations subject to direct sunlight.
  - Locations subject to temperatures or humidity outside the range specified in the specifications.
  - Locations subject to condensation as the result of severe changes in temperature.
  - Locations subject to corrosive or flammable gases.
  - Locations subject to dust (especially iron dust) or salts.
  - Locations subject to exposure to water, oil, or chemicals.
  - Locations subject to shock or vibration.

- Take appropriate and sufficient countermeasures when installing systems in the following locations:
  - Locations subject to static electricity or other forms of noise.
  - Locations subject to strong electromagnetic fields.
  - Locations subject to possible exposure to radioactivity.
  - Locations close to power supplies.

Regulations and Standards

Conformance to EC Directives

Applicable Directives

- EMC Directives
- Low Voltage Directive

Concepts

● EMC Directives

OMRON devices that comply with EC Directives also conform to the related EMC standards so that they can be more easily built into other devices or the overall machine. The actual products have been checked for conformity to EMC standards (see the following note). Whether the products conform to the standards in the system used by the customer, however, must be checked by the customer.

EMC-related performance of the OMRON devices that comply with EC Directives will vary depending on the configuration, wiring, and other conditions of the equipment or control panel on which the OMRON devices are installed.

The customer must, therefore, perform the final check to confirm that devices and the overall machine conform to EMC standards.

* Applicable EMC (Electromagnetic Compatibility) standards are as follows:
EMS (Electromagnetic Susceptibility):
CS Series: EN 61131-2 and EN 61000-6-2
CJ Series: EN 61000-6-2

* EMI (Electromagnetic Interference):
EN 61000-6-4 (Radiated emission: 10-m regulations)

● Low Voltage Directive

Always ensure that devices operating at voltages of 50 to 1,000 V AC and 75 to 1,500 V DC meet the required safety standards for the PLC (EN 61131-2).

● Conformance to EC Directives

The CJ-series PLCs comply with EC Directives. To ensure that the machine or device in which the CJ-series PLC is used complies with EC Directives, the PLC must be installed as follows:

- The CJ-series PLC must be installed within a control panel.
- You must use reinforced insulation or double insulation for the DC power supplies connected to DC Power Supply Units and I/O Units.
- CJ-series PLCs complying with EC Directives also conform to the Common Emission Standard (EN 61000-6-4). Radiated emission characteristics (10-m regulations) may vary depending on the configuration of the control panel used, other devices connected to the control panel, wiring, and other conditions. You must therefore confirm that the overall machine or equipment complies with EC Directives.

Conformance to Shipbuilding Standards

This product conforms to the following shipbuilding standards. Applicability to the shipbuilding standards is based on certain usage conditions. It may not be possible to use the product in some locations. Contact your OMRON representative before attempting to use a PLC on a ship.

Usage Conditions for NK and LR Shipbuilding Standards

● Usage Conditions for Applications Other Than on the Bridge or Deck

- The PLC must be installed in a control panel.
- Gaps in the door to the control panel must be completely filled or covered with gaskets or other material.

● Usage Conditions for Bridge and Deck (Certified Only by NK)

- The PLC must be installed in a control panel.
- Gaps in the door to the control panel must be completely filled or covered with gaskets or other material.
- The following noise filter must be connected to the power supply line.

Noise Filter

Manufacturer	Cosel Co., Ltd.
Model	TAH-06-683

Trademarks

SYSMAC is a registered trademark for Programmable Controllers made by OMRON Corporation.

CX-One is a registered trademark for Programming Software made by OMRON Corporation.

Windows is a registered trademark of Microsoft Corporation.

Other system names and product names in this document are the trademarks or registered trademarks of their respective companies.

Related Manuals

Manuals related to a PLC built using a CJ-series CJ2 CPU Unit are listed in the following table. Use these manuals for reference.

Manual	Cat. No.	Model	Application	Description
CJ-series CJ2 CPU Unit Hardware User's Manual (this manual)	W472	CJ2H-CPU□□-EIP	Hardware specifications for CJ2 CPU Units	Describes the following for CJ2 CPU Units: • Overview and features • Basic system configuration • Part nomenclature and functions • Mounting and setting procedure • Remedies for errors • Also refer to the *Software User's Manual* (W473).
CJ-series CJ2 CPU Unit Software User's Manual	W473	CJ2H-CPU□□-EIP	Software specifications for CJ2 CPU Units	Describes the following for CJ2 CPU Units: • CPU Unit operation • Internal memory • Programming • Settings • Functions built into the CPU Unit Also refer to the *Hardware User's Manual* (W472)
EtherNet/IP Units Operation Manual	W465	CJ2H-CPU□□-EIP CS1W-EIP21 CJ1W-EIP21	Using the built-in EtherNet/IP port of the CJ2 CPU Unit	Describes the built-in EtherNet/IP port and EtherNet/IP Units. Describes basic settings, tag data links, FINS communications, and other functions.
CS/CJ/NSJ-series Instructions Reference Manual	W474	CJ2H-CPU□□-EIP CS1G/H-CPU□□H CS1G/H-CPU□□-V1 CJ1G/H-CPU□□H CJ1G-CPU□□ CJ1M-CPU□□ NSJ□-□□□□(B)-G5D NSJ□-□□□□(B)-M3D	Information on instructions	Describes each programming instruction in detail. Also refer to the *Software User's Manual* (W473) when you do programming.
CS/CJ/CP/NSJ-series Communications Command Reference Manual	W342	CS1G/H-CPU□□H CS1G/H-CPU□□-V1 CS1D-CPU□□H CS1D-CPU□□S CS1W-SCU□□-V1 CS1W-SCB□□-V1 CJ1H-CPU□□H-R CJ1G/H-CPU□□H CJ1G-CPU□□P CJ1M-CPU□□ CJ1G-CPU□□ CJ1W-SCU□□-V1 CP1H-X□□□□-□ CP1H-XA□□□□-□ CP1H-Y□□□□-□ NSJ□-□□□□(B)-G5D NSJ□-□□□□(B)-M3D	Information on communications for CS/CJ/CP-series CPU Units and NSJ-series Controllers	Describes C-mode commands and FINS commands Refer to this manual for a detailed description of commands for communications with the CPU Unit using C mode commands or FINS commands. **Note** This manual describes the communications commands that are addressed to CPU Units. The communications path that is used is not relevant and can include any of the following: serial ports on CPU Units, communications ports on Serial Communications Units/Boards, and Communications Units. For communications commands addressed to Special I/O Units or CPU Bus Units, refer to the operation manual for the related Unit.
CX-One Setup Manual	W463	CXONE-AL□□C-V3/AL□□D-V3	Installing software from the CX-One	Provides an overview of the CX-One FA Integrated Tool Package and describes the installation procedure.
CX-Programmer Operation Manual	W446	WS02-CX□□-V□	Support Software for Windows computers CX-Programmer operating procedure	Describes operating procedures for the CX-Programmer. Also refer to the *Software User's Manual* (W473) and *Instructions Reference Manual* (W474) when you do programming.
CX-Programmer Operation Manual Functions Blocks	W447			
CX-Programmer Operation Manual SFC Programming	W469			

Manual	Cat. No.	Model	Application	Description
CS/CJ/CP/NSJ-series CX-Simulator Operation Manual	W366	WS02-SIMC1-E	Operating procedures for CX-Simulator Simulation Support Software for Windows computers Using simulation in the CX-Programmer with CX-Programmer version 6.1 or higher	Describes the operating procedures for the CX-Simulator. When you do simulation, also refer to the *CX-Programmer Operation Manual* (W446), *Software User's Manual* (W473), and *Instructions Reference Manual* (W474).
CS/CJ/CP/NSJ-series CX-Integrator Network Configuration Software Operation Manual	W464	CXONE-AL□□C-V3/ CXONE-AL□□D-V3	Network setup and monitoring	Describes the operating procedures for the CX-Integrator.

1

Overview

This section provides an overview of the CJ2 PLCs.

1-1 Overview of CJ2 CPU Units 1-2
1-1-1 Overview 1-2
1-1-2 CJ2 CPU Unit Features 1-3
1-2 Basic Operating Procedure 1-7
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1-1 Overview of CJ2 CPU Units

1-1-1 Overview

The SYSMAC CJ2 CPU Units are high-speed multi-functional CPU Units with a large memory capacity. They provide the following features.

● Fast, with Large Memory Capacity

Basic performance is faster and memory capacity has been increased to provide ample capability for machine control.

● Built-in EtherNet/IP Port

The CJ2 CPU Units support the EtherNet/IP open network as a standard feature. Support Software connection and universal Ethernet communications, such as data links between PLCs, message communications between PLCs, and FTP transfers, are all possible.

● General-purpose Networks for Support Software Interface

Support Software and devices can be easily connected using commercially available cable to general-purpose networks via USB and EtherNet/IP ports.

● Tag Access

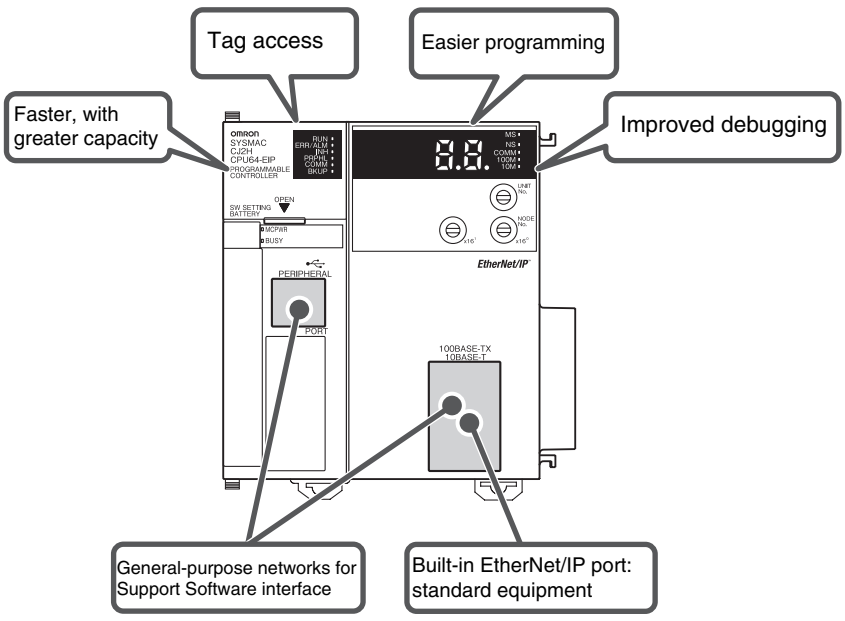
CJ2 CPU Units have a tag name server to manage tag names and I/O addresses. This enables access from external devices using tag names, without needing to know the I/O addresses.

● Easier Programming

CJ2 CPU Units offer a highly readable programming environment, including features such as addressing DM and EM Area bits, setting address offsets, and using array variables.

● Improved Debugging

Online editing and data tracing have been improved, greatly increasing the efficiency of debugging.



1-1-2 CJ2 CPU Unit Features

Fast, with Large Memory Capacity

● High-speed Processing

High-speed processing times of 0.016 μs for basic instructions, 0.048 μs for special instructions, and 0.99 μs for immediate refreshing, are now possible.

● Large Program Capacity

The CJ2 CPU Units provide a large program capacity of up to 400 Ksteps.

● Large Data Memory Capacity

The CJ2 CPU Units provide a large EM Area capacity of up to 800 Kwords (25 banks).

● Up to 128 Cyclic Tasks

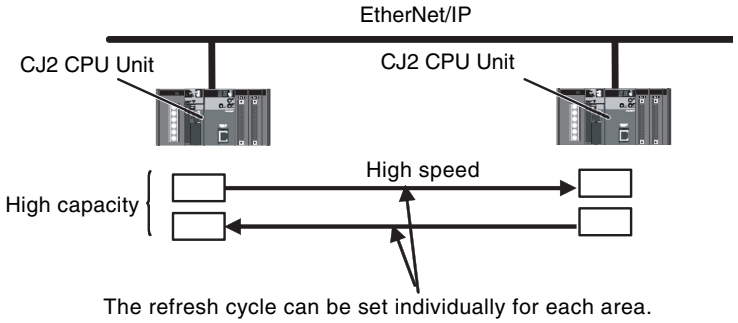
The user program can be divided into up to 128 tasks. Using smaller task programs makes it easier to structure programs and contributes to shorter cycle times.

Built-in EtherNet/IP Port

The CJ2 CPU Units provide as standard equipment a built-in EtherNet/IP port that supports the same FINS Ethernet functions as an Ethernet Unit (including features such as a FINS server and time coordination) as well as the EtherNet/IP open network.

● High-speed, High-capacity Data Links with User-set Refresh Cycles

The CJ2 CPU Units provide high-speed, high-capacity data links, and refresh cycles can be set individually for each data link area.



In addition, using the EtherNet/IP DataLink Tool makes it possible to set the data links using an interface similar to that of the Controller Link automatic data link setup.

General-purpose Networks for Support Software Interface

● Built-in USB and EtherNet/IP Ports

Commercially available USB cable can be used to connect directly from a USB port on a personal computer. In addition, a PLC on the EtherNet/IP network can be accessed via USB.

● Prevent Connecting to the Wrong PLC by Using PLC Names from Support Software

A user-set PLC name can be recorded in a CJ2 CPU Unit. When using Support Software to connect online to a PLC, verification of the PLC name prevents incorrect connections from the Support Software.

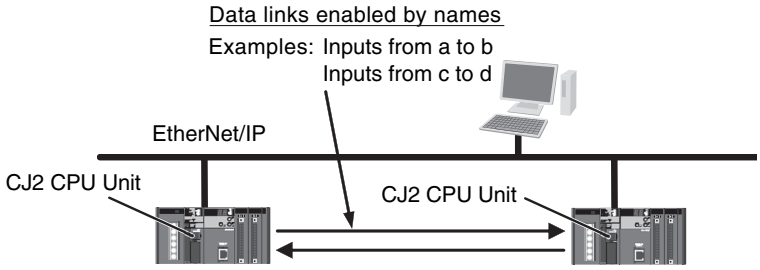
Tag Access

● Network Symbols (Tags) for Flexible Support of Program Changes

The CJ2 CPU Units support network symbols (tags). They have an internal tag name server that enables them to store tag names and addresses in advance in symbol tables in the CPU Units. Tags enable the following features.

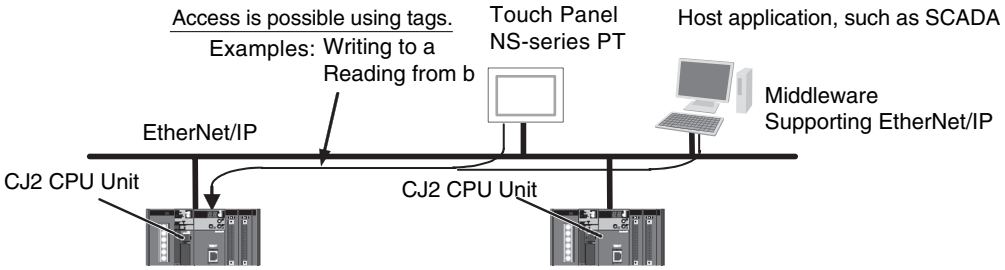
Data links can be set using tags.

With data links on an EtherNet/IP network, send and receive areas can be specified using symbols rather than addresses. This enables flexible support for design changes by allowing the data link areas set by tags to remain unchanged, while simply changing the symbol tables that contain the tag names and addresses.



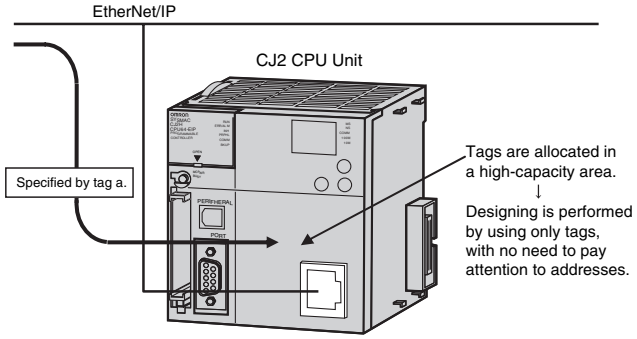
Access from host devices is enabled using tags.

Tags can be used for access from host devices, such as touch panel NS-series Programmable Terminals. This makes the creation of host screens and programs at devices such as PTs much more convenient.



Automatic tag allocation makes it unnecessary to know the addresses.

Automatic allocation of tags in the high-capacity EM Area, using automatic address allocation in CX-Programmer symbol tables, enables data link design and access from host devices without having to pay attention to addresses.


EtherNet/IP
CJ2 CPU Unit
Specified by tag a.
Tags are allocated in a high-capacity area.
↓
Designing is performed by using only tags, with no need to pay attention to addresses.

Easier Programming

● Address offsets can be specified.

When an address is specified for an instruction operand, an offset can be specified in brackets after the address to offset it. For example, by setting a word address in brackets to specify the offset, the address can be dynamically specified according to the contents of that word.

Example
W0.00[D0]: W0.00 is the starting address and the contents of D0 is the offset. If D0 is &3, then W0.03 is specified.

● Symbols can be specified for array variable subscripts.

By specifying symbols for array variable subscripts, elements can be dynamically specified according to the values of the symbols.

Example
a[b]: The value of symbol b specifies the element for array variable a[ ].

● Bit addresses can be used in the DM Area and EM Area.

Previously the DM Area and the EM Area could be addressed only by words, and bit addresses could not be specified. The work area for bits can now be expanded by enabling bit addresses in the DM and EM Areas.

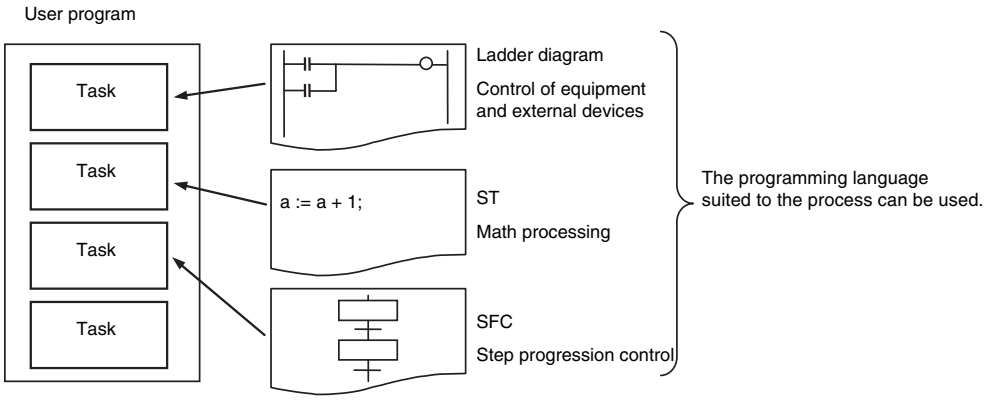
For example, D10.00 specifies bit 00 of D10.

● The format for timer/counter PV refreshing can be selected individually for each instruction.

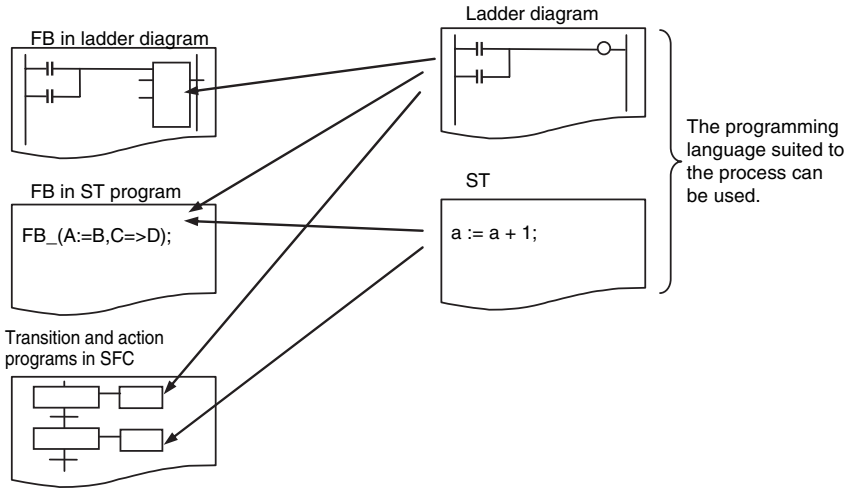
Either BCD or binary can be selected individually for each instruction as the format for timer/counter PV refreshing. For example, the TIM (BCD) and TIMX (binary) instructions can be used together.

● The optimum languages can be combined for structured programming.

Ladder diagrams, ST, and SFC languages can be freely combined in the user program. Being able to use the optimum languages for a particular process helps reduce the time involved in programming.



In addition, ladder diagrams and ST language can be freely used for function blocks (FBs) in ladder diagrams and ST programs, and for transition and action programs in SFC. This feature makes it possible to optimize structured programming.


FB in ladder diagram
Ladder diagram
FB in ST program
FB_(A:=B,C=>D);
ST
a := a + 1;
Transition and action programs in SFC
The programming language suited to the process can be used.

Improved Debugging

● Reduced Effect on Cycle Time from Online Editing

The additional cycle time due to online editing has been reduced to approx. 1 ms, minimizing the effects on equipment operation during debugging.

● Fast, High-capacity Data Tracing

Up to 32 Kwords of data can be traced (8 time more than previously), with ample trigger conditions, and data can be traced continuously for long periods of time.

1-2 Basic Operating Procedure

In general, use the following procedure.

1. Setting Devices and Hardware

Mount the Power Supply Unit, the CPU Unit, the other Units, and the End Covers. Set the DIP switch and rotary switches as required.

Refer to *Section 3 Nomenclature and Functions* and *Section 5 Installation* in the *CJ2 CPU Unit Hardware Operation Manual* (Cat. No. W472).

2. Wiring

Wire the power supply, I/O, and communications. Refer to the following manuals.

Refer to *Section 5 Installation* in the *CJ2 CPU Unit Hardware Operation Manual* (Cat. No. W472).
Refer to *Section 11 Programming Devices and Communications* in the *CJ2 CPU Unit Software Operation Manual* (Cat. No. W473).

3. Connecting Online to the PLC

Connect the personal computer online to the PLC.

Refer to *Section 4 Support Software* in the *CJ2 CPU Unit Hardware Operation Manual* (Cat. No. W472)

4. I/O Allocations

Using the CX-Programmer, allocate I/O memory in the CPU Unit to the mounted Units.

Refer to *Section 8 I/O Allocations and Unit Settings* in the *CJ2 CPU Unit Software Operation Manual* (Cat. No. W473)

5. Software Setup

Make the PLC software settings.

- CPU Unit initialization: Refer to *Section 4 CPU Unit Initialization* in the *CJ2 CPU Unit Software Operation Manual* (Cat. No. W473).
- DM Area Settings for Special I/O Units and CPU Bus Units: Refer to *Section 8 I/O Allocations and Unit Settings* in the *CJ2 CPU Unit Software Operation Manual* (Cat. No. W473).
- PLC Setup: Refer to *Section 9 PLC Setup* in the *CJ2 CPU Unit Software Operation Manual* (Cat. No. W473).

6. Creating the Program

Create the program using the CX-Programmer.

Refer to *Section 5 Programming* in the *CJ2 CPU Unit Software Operation Manual* (Cat. No. W473).

7. Checking Operation

Check the I/O wiring and the AR Area settings, and perform trial operation. The CX-Programmer can be used for monitoring and debugging.

Refer to *10-7 Debugging* in the *CJ2 CPU Unit Software Operation Manual* (Cat. No. W473).

8. Basic Program Operation

Set the operating mode to RUN mode to start operation.

1-3 Specifications

1-3-1 General Specifications

Item		CJ2H-				
		CPU64-EIP	CPU65-EIP	CPU66-EIP	CPU67-EIP	CPU68-EIP
Enclosure		Mounted in a panel				
Grounding		Less than 100 Ω				
CPU Rack Dimensions		90 mm x 65 mm x 80 mm (W x H x D)				
Weight		280 g or less				
Current Consumption		5 VDC, 0.82 A				
Use Environment	Ambient Operating Temperature	0 to 55°C				
	Ambient Operating Humidity	10% to 90%				
	Atmosphere	Must be free from corrosive gases.				
	Ambient Storage Temperature	–20 to 70°C (excluding battery)				
	Altitude	2,000 m or less				
	Pollution Degree	2 or less: Conforms to JIS B3502 and IEC 61131-2.				
	Noise Immunity	2 kV on power supply line (Conforms to IEC 61000-4-4.)				
	Overvoltage Category	Category II: Conforms to JIS B3502 and IEC 61131-2.				
	EMC Immunity Level	Zone B				
	Vibration Resistance	Conforms to JIS C60068-2-6. Acceleration of 9.8 m/s^2 for 100 min in X, Y, and Z directions (10 sweeps of 10 min each = 100 min total)				
	Shock Resistance	Conforms to JIS C60068-2-27. 147 m/s^2, 3 times in X, Y, and Z directions (100 m/s^2 for Relay Output Units)				
Battery	Life	5 years at 25°C				
	Model	CJ1W-BAT01				
Applicable Standards		Conforms to cULus and EC Directives.				

1-3-2 Performance Specifications

Items			CJ2H-				
			CPU64-EIP	CPU65-EIP	CPU66-EIP	CPU67-EIP	CPU68-EIP
User Memory			50K steps	100K steps	150K steps	250K steps	400K steps
I/O Bits			2,560 bits				
Processing Speed	Overhead Processing Time		Normal Mode: 200 μs (If tag data links are used with EtherNet/IP, add the following to the above time: 100 μs + Number of transferred words × 0.33 μs)				
	Execution Time		Basic Instructions: 0.016 μs min.; Special Instructions: 0.048 μs min.				
	Interrupt Task Start Time		30 μs				
Maximum Number of Connectable Units			Total per CPU Rack or Expansion Rack: 10 Units max.; Total per PLC: 40 Units max.				
Maximum Number of Expansion Racks			3 max.				
CIO Area	I/O Area		2,560 bits (160 words): Words CIO 0000 to CIO 0159				
	Link Area		3,200 bits (200 words): Words CIO 1000 to CIO 1199				
	CPU Bus Unit Area		6,400 bits (400 words): Words CIO 1500 to CIO 1899				
	Special I/O Unit Area		15,360 bits (960 words): Words CIO 2000 to CIO 2959				
	DeviceNet Area		9,600 bits (600 words): Words CIO 3200 to CIO 3799				
	Internal I/O Area		3,200 bits (200 words): Words CIO 1300 to CIO 1499 37,504 bits (2,344 words): Words CIO 3800 to CIO 6143 Cannot be used for external I/O.				
Work Area			8,192 bits (512 words): Words W000 to W511 Cannot be used for external I/O.				
Holding Area			8,192 bits (512 words): Words H000 to H511 Bits in this area maintain their ON/OFF status when PLC is turned OFF or operating mode is changed. Words H512 to H1535: These words can be used only for function blocks. They can be used only for function block instances (i.e., they are allocated only for internal variables in function blocks).				
Auxiliary Area			Read-only: 31,744 bits (1,984 words) • 7,168 bits (448 words): Words A0 to A447 • 24,576 bits (1,536 words): Words A10000 to A11535 Read/write: 16,384 bits (1,024 words) in words A448 to A1471				
Temporary Area			16 bits: TR0 to TR15				
Timer Area			4,096 timer numbers (T0000 to T4095 (separate from counters))				
Counter Area			4,096 counter numbers (C0000 to C4095 (separate from timers))				
DM Area			32k words (Bits in the DM Area can be addressed either by bit or by word.) DM Area words for Special I/O Units: D20000 to D29599 (100 words × 96 Units) DM Area words for CPU Bus Units: D30000 to D31599 (100 words × 16 Units)				
EM Area			32k words/1 bank × 25 banks max.: E00_00000 to E18_32767 max. (Bits in the EM Area can be addressed either by bit or by word.)				
			32k × 4 banks	32k × 4 banks	32k × 10 banks	32k × 15 banks	32k × 25 banks
		Force-set/reset Enabled Banks	EM3	EM3	EM6 to EM9	EM7 to EME	EM11 to EM18
			Force-setting/resetting is enabled only for areas specified for automatic address allocation.				
Index Registers			IR0 to IR15 These are special registers for storing PLC memory addresses for indirect addressing. (Index Registers can be set so that they are unique in each task or so that they are shared by all tasks.)				
Cyclic Task Flag Area			128 flags				
Memory Card			128 MB, 256 MB, or 512 MB				
Operating Modes			PROGRAM Mode: Programs are not executed. Preparations can be executed prior to program execution in this mode. MONITOR Mode: Programs are executed, and some operations, such as online editing, and changes to present values in I/O memory, are enabled in this mode. RUN Mode: Programs are executed. This is the normal operating mode.				
Execution Mode			Normal Mode				

Items		CJ2H-				
		CPU64-EIP	CPU65-EIP	CPU66-EIP	CPU67-EIP	CPU68-EIP
Programming Languages		Ladder Logic (LD), Sequential Function Charts (SFC), Structured Text (ST), and Instruction Lists (IL)				
Function Blocks	Maximum number of definitions	2,048				
	Maximum number of instances	2,048				
Tasks	Type of Tasks	Cyclic tasks Interrupt tasks (Power OFF interrupt tasks, scheduled interrupt tasks, I/O interrupt tasks, and external interrupt tasks)				
	Number of Tasks	Cyclic tasks: 128 Interrupt tasks: 256 (Interrupt tasks can be defined as cyclic tasks to create extra cyclic tasks. Therefore, the total number of cyclic tasks is actually 384 max.)				
Symbols (Variables)	Type of Symbols	• Local symbols: Can be used only within a single task in the PLC. • Global symbols: Can be used in all tasks in the PLC. • Network symbols (tags): I/O memory in the CPU Unit can be externally accessed using symbols, depending on parameter settings.				
	Data Type of Symbols	• BOOL (bit) • UINT (one-word unsigned binary) • UDINT (two-word unsigned binary) • ULINT (four-word unsigned binary) • UINT BCD (one-word unsigned BCD) • INT (one-word signed binary) • DINT (two-word signed binary) • LINT (four-word signed binary) • UDINT BCD (two-word unsigned BCD) • ULINT BCD (four-word unsigned BCD) • REAL (two-word floating-point), LREAL (four-word floating-point) • CHANNEL (word), NUMBER (constant or number) • WORD (one-word hexadecimal) • DWORD (two-word hexadecimal) • LWORD (four-word hexadecimal) • TIMER • COUNTER				
	Maximum Size of Symbol	32k words				
	Array Symbols (Array Variables)	One-dimensional arrays				
	Number of Array Elements	32,000 elements max.				
	Number of Registrable Tags	20,000 max.				
	Length of Tag Name	255 bytes max.				
	Encode of Tag Name	UTF-8				
Data Tracing	Memory Capacity	8,000 words		16,000 words	32,000 words	
		(Up to 32k words x 25 banks when EM is specified in CX-Programmer)				
	Number of Samplings	Bits = 31, one-word data =16, two-word data = 8, four-word data = 4				
	Sampling Cycle	1 to 2,550 ms (Unit: 1 ms)				
	Trigger Conditions	ON/OFF of specified bit Data comparison of specified word Data size: 1 word, 2 words, 4 words Comparison Method: Equals (=), Greater Than (>), Greater Than or Equals (3), Less Than (<), Less Than or Equals (≤), Not Equal (≠)				
	Delay Value	−32,768 to +32,767 ms				
File Memory		Memory Card (128, 256, or 512 Mbytes) (Use the Memory Cards provided by OMRON.) EM file memory (Part of the EM Area can be converted for use as file memory.)				
Source/Comment Memory	Function block program memory, comment file, program index file, symbol tables	Capacity: 3.5 Mbytes				

Item				CJ2H-				
				CPU64-EIP	CPU65-EIP	CPU66-EIP	CPU67-EIP	CPU68-EIP
Communications	Logical Ports for Communications	Logical Ports		8 ports (Used for SEND, RECV, CMND, PMCR, TXDU, and RXDU instructions.)				
		Extended Logical Ports		64 ports (Used for SEND2, RECV2, CMND2, and PMCR2 instructions.)				
	CIP Communications Specification	Class 3 (Number of Connections)		Number of connections: 64				
		UCMM (Non-connection Type)		Maximum number of clients that can communicate at the same time: 32 Maximum number of servers that can communicate at the same time: 40				
	Peripheral (USB) Port			USB 2.0-compliant B-type connector				
	Baud Rate			12 Mbps max.				
	Transmission Distance			5 m max.				
	Serial Port			Interface: Conforms to EIA RS-232C.				
	Communications Method			Half-duplex				
	Synchronization Method			Start-stop				
	Baud Rate			0.3, 0.6, 1.2, 2.4, 4.8, 9.6, 19.2, 38.4, 57.6, or 115.2 (kbps)				
	Transmission Distance			15 m max.				
	EtherNet/IP Port			---				
	Transmission Specifications	Media Access Method		CSMA/CD				
		Modulation		Baseband				
		Transmission Paths		Star				
		Baud Rate		100 Mbps (100Base-TX)				
		Transmission Media		Shielded twisted-pair (STP) cable; Categories: 5, 5e				
		Transmission Distance		100 m (between hub and node)				
		Number of Cascade Connections		No restrictions if switching hub is used.				
	Communications Specifications	CIP Communications: Tag Data Links		---				
			Number of Connections	256				
			Packet Interval (Refresh period)	0.5 to 10,000 ms (Unit: 0.5 ms) Can be set for each connection. (Data will be refreshed at the set interval, regardless of the number of nodes.)				
			Permissible Communications Band	6,000 pps *1				
			Number of Tag Sets	256				
			Type of Tags	CIO, DM, EM, HR, and WR				
			Number of Tags per Connection	8 (Seven tags if PLC status is included in the segment.)				
			Maximum Link Data Size per Node	184,832 words				
			Maximum Data Size per Connection	252 or 722 words *2 (Data is synchronized within each connection.)				
			Number of Registrable Tag Set	256 (1 connection = 1 segment)				
			Maximum Tag Set Size	722 words (One word is used when PLC status is included in the segment.)				
			Maximum Number of Tags Refreshable in a Single Cycle of CPU Unit	Output/send (CPU Unit to EtherNet/IP): 256 Input/receive (EtherNet/IP to CPU Unit): 256				
			Data Size Refreshable in a Single Cycle of CPU Unit	Output/Transmission (CPU to EtherNet/IP): 6,432 words Input/Reception (EtherNet/IP to CPU): 6,432 words				
			Change of Tag Data Link Parameter Settings during Operation	OK *4				
			Multi-cast Packet Filter	OK				
		CIP Communications: Explicit Messages		---				
			Class 3 (Number of Connections)	Number of connections: 128				
			UCMM (Non-connection Type)	Maximum number of clients that can communicate at the same time: 32 Maximum number of servers that can communicate at the same time: 32				
			CIP Routing	OK (CIP routing is enabled for the following remote Units: CJ1W-EIP21 and CJ2H-CPU6□-EIP.)				
		FINS Communications		---				
			FINS/UDP	OK				
			FINS/TCP	16 connections max.				
		EtherNet/IP Conformance Test		Conforms to A5.				
		EtherNet/IP Interface		10Base-T/100Base-TX Auto Negotiation/Fixed Setting				

*1 “Packets per second” is the number of communications packets that can be processed per second.

*2 Large Forward Open (CIP optional specification) must be supported in order for 505 to 1,444 bytes to be used as the data size. Application is supported between CS/CJ-series PLCs. When connecting to devices from other manufacturers, make sure that the devices support the Large Forward Open specification.

*3 If the maximum number is exceeded, refreshing will require more than one CPU Unit cycle.

*4 When changing parameters, however, the EtherNet/IP port where the change is made will be restarted. In addition, a timeout will temporarily occur at the other node that was communicating with that port, and it will then recover automatically.

*5 The EtherNet/IP port supports an IGMP client, so unnecessary multicast packets are filtered by using a switching hub that supports IGMP snooping.

1-3-3 Function Specifications

Functions				Description
Cycle Time Management	Minimum Cycle Time			A minimum cycle time can be set. (0.2 to 32,000 ms; Unit: 0.1 ms)
	Cycle Time Monitoring			The cycle time is monitored. (0.01 to 40,000 ms; Unit: 0.01 ms)
	Background Processing			Instructions with long execution times can be executed over multiple cycles to prevent fluctuations in the cycle time.
Unit (I/O) Management	Basic I/O Units, Special I/O Units, and CPU Bus Units	I/O Refreshing	Cyclic Refreshing	Cyclic refreshing of Basic I/O Units, Special I/O Units, and CPU Bus Units
			Immediate Refreshing	I/O refreshing by immediate refreshing instructions
			Refreshing by IORF	I/O refreshing by IORF instruction
		Unit Recognition at Startup		The number of units recognized when the power is turned ON is displayed.
	Basic I/O Units	Input Response Time Setting		The input response times can be set for Basic I/O Units. The response time can be increased to reduce the effects of chattering and noise at input contacts. The response time can be decreases to enable detecting shorter input pulses.
		Load OFF Function		All of the outputs on Basic I/O Units can be turned OFF when an error occurs in RUN or MONITOR mode.
		Basic I/O Unit Status Monitoring		Alarm information can be read from Basic I/O Units and the number of Units recognized can be read.
	Special I/O Units and CPU Bus Units	Unit Restart Bits to Reset Units		A Special I/O Unit or CPU Bus Unit can be reset.
	Configuration Management	Automatic I/O Allocation at Startup		I/O words can be automatically allocated to the Basic I/O Units that are started to start operation automatically without registering Units into I/O tables.
		I/O Table Creation		The current unit configuration can be registered in I/O tables to prevent it from being changed, to reserve words, and to set words.
		Rack/Slot First Word Settings		The first words allocated to a Units on the Racks can be set.
Memory Management	Holding I/O Memory when Changing Operating Modes			The status of I/O memory can be held when the operating mode is changed or power is turned ON. The forced-set/reset status can be held when the operating mode is changed or power is turned ON.
	File Memory			Files (such as program files, data files, and symbol table files) can be stored in Memory Card, EM File Memory, or Comment Memory.
	Built-in Flash Memory			The user program and Parameter Area can be backed up to an internal flash memory when they are transferred to the CPU Unit.
	EM File Function			Parts of the EM Area can be treated as file memory.
	Storing Comments			I/O comments can be stored as symbol table files in a Memory Card, EM file memory, or comment memory.
	EM Configuration			EM Area can be set as trace memory or EM file memory.
Memory Cards	Automatic File Transfer at Startup			A program file and parameter files can be read from a Memory Card when the power is turned ON.
	Program Replacement during PLC Operation			The whole user program can be read from a Memory Card to CPU Unit during operation.
	Function for Reading and Writing Data from a Memory Card			Data in I/O memory in the CPU Unit can be written to a Memory Card in CSV/TXT format. Data in CSV/TXT format in the Memory Card can be read to I/O memory in the CPU Unit.

Function			Description
Communications			---
	Peripheral (USB) Port	Peripheral Bus	Bus for communications with various kinds of Support Software running on a personal computer. High-speed communications are supported.
	Serial Port		---
		Host Link (SYSWAY) Communications	Host Link commands or FINS commands placed between Host Link headers and terminators can be sent to host computer or PT to read/write I/O memory, read/control the operating mode, and perform other operations for PLC.
		No-protocol Communications	I/O instructions for communications ports (such as TXD/RXD instructions) can be used for data transfer with peripheral devices such as bar code readers and printers.
		NT Link Communications	I/O memory in the PLC can be allocated and directly linked to various PT functions, including status control areas, status notification areas, touch switches, lamps, memory tables, and other objects.
		Peripheral Bus	Bus for communications with various kinds of Support Software running on a personal computer. High-speed communications are supported. FINS and CIP commands can be sent/received.
		Serial Gateway	This gateway enables receiving and automatically converting FINS to the CompoWay/F.
	EtherNet/IP Port		100Base-TX/10Base-T Protocols: TCP/IP, UDP, ARP, ICMP (ping only), BOOTP Applications: FINS, CIP, POP3, SMTP, SNTP, DNS (Client), FTP (Server)
		CIP Communications Service: Tag Data Links	Programless cyclic data exchanges with the devices on the EtherNet/IP network.
		CIP Communications Service: Message Communications	Any CIP commands can be transferred with the devices on the EtherNet/IP network.
		FINS Communications Service: Message Communications	Any FINS commands can be transferred with the devices on the EtherNet/IP network.
Interrupt	Scheduled Interrupts		Tasks can be executed at a specified interval (0.2 ms min., Unit: 0.1 ms).
	Power OFF Interrupts		A task can be executed when CPU Unit's power turns OFF.
	I/O Interrupt Tasks		A task can be executed when an input signal is input to an Interrupt Input Unit.
	External Interrupt Tasks		A task can be executed when interrupts are requested from a Special I/O Unit or CPU Bus Unit.
Clock	Clock Function		Cock data is stored in memory. Accuracy (Accuracy depends on the temperature.) Ambient temperature of 55°C: –3.5 to +0.5 min error per month Ambient temperature of 25°C: –1.5 to +1.5 min error per month Ambient temperature of 0°C: –3 to +1 min error per month
	Operation Start Time Storage		The time when operating mode was last changed to RUN mode or MONITOR mode is stored.
	Operation Stop Time Storage		The last time a fatal error occurs or the last time the operating mode was changed to PROGRAM mode is stored.
	Startup Time Storage		The time when the power was turned ON is stored.
	Power Interruption Time Storage		The time when the power is turned OFF is stored.
	Total Power ON Time Calculation		The total time that the PLC has been ON is stored in increments of 10 hours.
	Power ON Clock Data Storage		A history of the times when the power was turned ON is stored.
	User Program Overwritten Time Storage		The time that the user program was last overwritten is stored.
	Parameter Date Storage		The time when the Parameter Area was overwritten is stored.

Function		Description
Power Supply Management	Memory Protection	Holding Area data, DM Area data, Counter Completion Flags, and counter present values are held even when power is turned OFF. CIO Area, Work Area, some Auxiliary Area data, and Timer Completion Flags, timer present values, index registers, and data registers can be protected by turning ON the IOM Hold Bit in the Auxiliary Area, and by also setting the IOM Hold Bit to "Hold" in the PLC Setup.
	Power OFF Detection Time Setting	The detection time for power interruptions can be set. AC power supply: 10 to 25 ms (variable) DC power supply: 2 to 5 ms (CJ1W-PD022) or 2 to 20 ms (CJ1W-PD025)
	Power OFF Detection Delay Time	The detection of power interruptions can be delayed: 0 to 10 ms (Not supported by the CJ1W-PD022.)
	Number of Power Interruptions Counter	The number of times power has been interrupted is counted.
Function Blocks		Standard programming can be encapsulated as function blocks.
	Languages in Function Block Definitions	Ladder programming or structured text
Debugging	Online Editing	The program can be changed during operation (in MONITOR or PROGRAM mode), except for block programming areas.
	Force-Set/Reset	Specified bits can be set or reset.
	Differentiate Monitoring	ON/OFF changes in specified bits can be monitored.
	Data Tracing	The specified I/O memory data can be stored in the trace memory in the CPU Unit. The triggers can be set. • The trace data can be uploaded during data tracing using CX-Programmer, which enables continuously logging the data by constantly uploading the trace data (trace data uploading during tracing). • Data tracing can be automatically started when operation is started (i.e., when the operating mode is changed from PROGRAM mode to MONITOR or RUN mode).
	Storing Location of Error when an Error Occurs	The location and task number where execution stopped for a program error is recorded.
	Program Check	The programs can be checked for items such as no END instruction and FALS/FAL errors at startup.
Self-diagnosis and Restoration	Error Log	A function is provided to store predefined error codes in CPU Unit, error information, and time at which the error occurred.
	CPU Error Detection	CPU Unit WDT errors are detected.
	User-defined Failure Diagnosis	Errors can be generated for user-specified conditions: Non-fatal errors (FAL) and fatal error (FALS). Program section time diagnosis and program section logic diagnosis are supported (FPD instruction).
	Load OFF Function	This function turns OFF all outputs from Output Units when an error occurs.
	RUN Output	This output from the CJ1W-PA205R turns ON while CPU Unit is in RUN mode or MONITOR mode.
	Basic I/O Load Short-circuit Detection	This function provides alarm information from Basic I/O Units that have load short-circuit protection.
	Failure Point Detection	The time and logic of an instruction block can be analyzes using the FPD instruction.
	CPU Standby Detection	This function indicates when the CPU Unit is on standby because all Special I/O Units and CPU Bus Units have not been recognized at the startup in RUN or MONITOR mode.

Function			Description
Self-diagnosis and Restoration (Continued from previous page)	Non-fatal Error Detection	System FAL Error Detection (User-defined non-fatal error)	This function generates a non-fatal (FAL) error when the user-defined conditions are met in program.
		Duplicate Refreshing Error Detection	This function detects an error when an immediate refreshing Instruction in an interrupt task is competing with I/O refreshing of a cyclic task.
		Basic I/O Unit Error Detection	This function detects the errors in Basic I/O Units.
		Backup Memory Error Detection	This function detects errors in the memory backup of the user programs and parameter area (backup memory).
		PLC Setup Error Detection	This function detects setting errors in the PLC Setup.
		CPU Bus Unit Error Detection	This function detects an error when there is an error in data exchange between the CPU Unit and a CPU Bus Unit.
		Special I/O Unit Error Detection	This function detects an error when there is an error in data exchange between the CPU Unit and a Special I/O Unit.
		Tag Memory Error Detection	This function detects errors in tag memory.
		Battery Error Detection	This function detects an error when a battery is not connected to the CPU Unit or when the battery voltage drops.
		CPU Bus Unit Setting Error Detection	This function detects an error when the model of a CPU Bus Unit in the registered I/O tables does not agree with the model that is actually mounted in the PLC.
		Special I/O Unit Setting Error Detection	This function detects an error when the model of a Special I/O Unit in the registered I/O tables does not agree with the model of Unit that is actually mounted.
		Memory Error Detection	This function detects errors that occur in memory of the CPU Unit.
		I/O Bus Error Detection	This function detects errors has occur in data transfers between the Units mounted in Rack slots and the CPU Unit and detects when the End Cover is not connected to the CPU Rack or an Expansion Rack.
		Unit/Rack Number Duplication Error	This function detects an error when the same unit number is set for two or more Units, the same word is allocated to two or more Basic I/O Units, or the same rack number is set for two or more Racks.
		Too Many I/O Points Error Detection	This function detects an error when the total number of I/O points set in the I/O tables or the number of Units per Rack exceeds the specified range.
		I/O Setting Error Detection	This function detects an error when the number of Units in the registered I/O tables does not agree with the actual number of Units that is mounted, or an Interrupt Unit has been connected in the wrong position, i.e., not in slot 0 to 3.
	Fatal Error Detection	Program Error Detection	This function detects errors in programs.
		Instruction Processing Error Detection	This function detects an error when the given data value is invalid when executing an instruction, or execution of instruction between tasks was attempted.
		Indirect DM/EM BCD Error Detection	This function detects an error when an indirect DM/EM address in BCD mode is not BCD.
		Illegal Area Access Error Detection	This function detects an error when an attempt is made to access an illegal area with an instruction operand.
		No END Error Detection	This function detects an error when there is no END instruction at the end of the program.
		Task Error Detection	This function detects an error when there are no tasks that can be executed in a cycle, there is no program for a task, or the execution condition for an interrupt task was met but there is no interrupt task with the specified number.
		Differentiation Overflow Error Detection	This function detects an error when too many differentiated instructions are entered or deleted during online editing (131,072 times or more).
		Invalid Instruction Error Detection	This function detects an error when an attempt is made to execute an instruction that is not defined in the system.
		User Program Area Overflow Error Detection	This function detects an error when instruction data is stored after the last address in user program area.
		Cycle Time Exceeded Error Detection	This function monitors the cycle time (10 to 40,000 ms) and stops the operation when the set value is exceeded.

Function			Description
Self-diagnosis and Restoration (Continued from previous page)	Fatal Error Detection (Continued from previous page)	System FALS Error Detection (User-defined Fatal Error)	This function generates a fatal (FALS) error when the user-defined conditions are met in program.
		Version Error Detection	This function detects an error when a user program includes a function that is not supported by the current unit version.
		Memory Card Error Detection	This function detects an error when the automatic file transfer from Memory Card fails at startup.
	Memory Self-restoration Function		This function performs a parity check on the user program area and self-restoration data.
Maintenance	Simple Backup Function		This function collectively backs up the data in CPU Unit (user programs, parameters, and I/O memory) and internal backup data in the I/O Units.
	Unsolicited Communications		A function that allows the PLC to use Network Communications Instruction to send required FINS commands to a computer connected via a Host Link
	Remote Programming and Monitoring		Host Link communications can be used for remote programming and remote monitoring through a Controller Link, Ethernet, DeviceNet, or SYSMAC Link Network. Communications across network layers can be performed. Controller Link or Ethernet: 8 layers DeviceNet or SYSMAC LINK: 3 layers
	Automatic Online Connection via Network	Direct Serial Connection	This function enables automatically connecting to the PLC online when the CX-Programmer is directly connected by a serial connection (peripheral (USB) port or serial port).
		Via Networks	This function enables connecting the CX-Programmer online to a PLC that is connected via an EtherNet/IP network.
Security	Read Protection using Password		This function protects reading and displaying programs and tasks using passwords. Write protection: Set using the DIP switch. Read protection: Set a password using the CX-Programmer.
	FINS Write Protection		This function prohibits writing by using FINS commands sent over the network.
	Unit Name Function		This function allows the users to give any names to the Units. Names are verified at online connection to prevent wrong connection
	Hardware ID Using Lot Numbers		This function sets operation protection by identifying hardware using the user programs according to lot numbers stored in the Auxiliary Area.

2

Basic System Configuration and Devices

This section describes the basic system configuration and devices used in a CJ2 PLC.

The CJ Series supports the following two types of system configuration.

- Basic System Configuration:
  System consisting of CPU Rack and Expansion Racks.
- Expanded System Configuration:
  System connected via CPU Unit built-in serial port and PLC Units, such as Communications Units.

2-1 Basic System Configuration 2-2
- 2-1-1 Basic System Configuration 2-2
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2-2 Expanded System Configuration 2-22
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2-1 Basic System Configuration

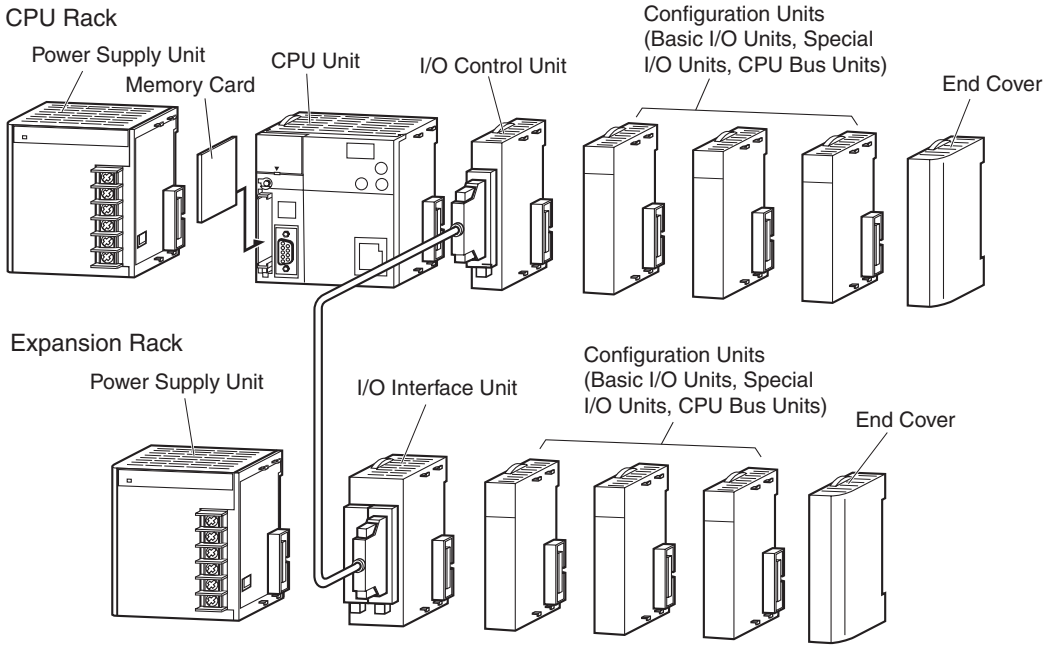
2-1-1 Basic System Configuration

● CPU Rack

A CPU Rack can consist of a CJ2 CPU Unit, a CJ-series Power Supply Unit, CJ-series Configuration Units (Basic I/O Units, Special I/O Units, CPU Bus Units), and a CJ-series End Cover. The same CJ-series Power Supply Units and CJ-series Configuration Units that are used with CJ1 CPU Units are used with CJ2 CPU Units. An I/O Control Unit is required to connect a CJ-series Expansion Rack. A Memory Card is optional.

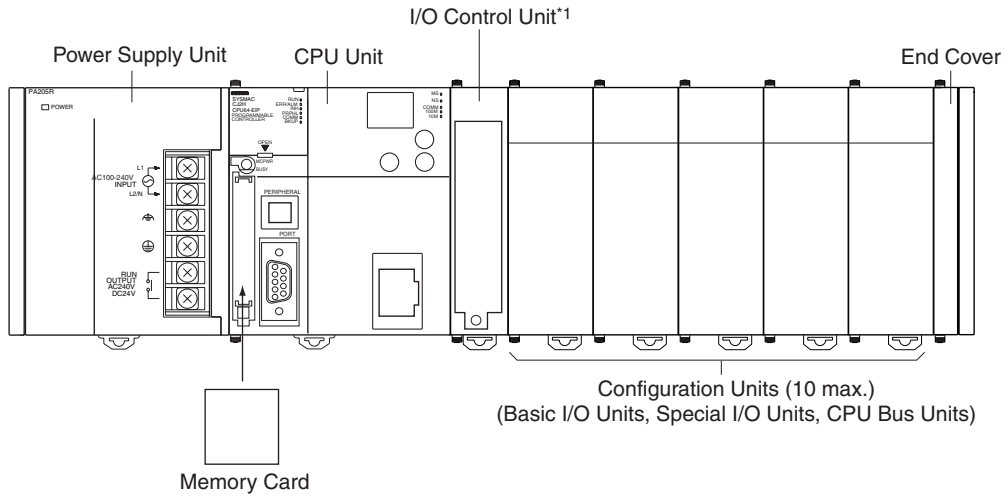
● Expansion Racks

A CJ-series Expansion Rack can be connected to the CPU Rack or another CJ-series Expansion Rack. An Expansion Rack can consist of an I/O Interface Unit, a Power Supply Unit, Basic I/O Units, Special I/O Units, CPU Bus Units, and an End Cover.



2-1-2 CPU Rack

The CPU Rack consists of a CJ2 CPU Unit, a CJ-series Power Supply Unit, CJ-series Configuration Units, and a CJ-series End Cover. Up to 10 Configuration Units can be connected.



*1 The I/O Control Unit is required only to connect an Expansion Rack. It must be connected next to the CPU Unit.

Although the CJ-series PLCs do not require Backplanes, the term “slot” is still used to refer to the relative position of a Unit in the Rack. Slot numbers increase toward the right side of the Rack.

Name	Configuration	Remarks
CJ-series CPU Rack	CJ2 CPU Unit (One End Cover is included.)	One required for every CPU Rack.
	CJ-series Power Supply Unit	
	Memory Card	Install as required.
	I/O Control Unit	Required to connect an Expansion Rack. Must be connected immediately to the right of the CPU Unit.
	End Cover	Must be connected to the right end of the CPU Rack. One End Cover is provided with the CPU Unit. A fatal error will occur if the End Cover is not connected.
	CJ-series Basic I/O Units	A total of up to 10 Units can be connected to the CPU Rack and to each of the Expansion Racks. (An error will occur if 11 or more Units are connected.)
	CJ-series Special I/O Units	
	CJ-series CPU Bus Units	

Units

● CJ2 CPU Units

Model	I/O capacity	Program capacity	DM Area capacity	Current consumption (A)		Weight
				5 VDC	24 VDC	
CJ2H-CPU68-EIP	2,560 points	400 Ksteps	832 Kwords (DM: 32 Kwords, EM: 32 Kwords × 25 banks)	0.82*1	---	280 g max.*2
CJ2H-CPU67-EIP		250 Ksteps	512 Kwords (DM: 32 Kwords, EM: 32 Kwords × 15 banks)			
CJ2H-CPU66-EIP		150 Ksteps	352 Kwords (DM: 32 Kwords, EM: 32 Kwords × 10 banks)			
CJ2H-CPU65-EIP		100 Ksteps	160 Kwords (DM: 32 Kwords, EM: 32 Kwords × 4 banks)			
CJ2H-CPU64-EIP		50 Ksteps	160 Kwords (DM: 32 Kwords, EM: 32 Kwords × 4 banks)			

*1 Increases by 0.15 A/Unit when an NT-AL001 Link Adapter is used.

*2 Includes the weight of the End Cover.

● CJ-series Power Supply Units

Model	Power supply voltage	Output capacity		Additional functions	Weight
		5 VDC	24 VDC		
CJ1W-PA205R	100 to 240 VAC	5.0 A	0.8 A	RUN output	350 g max.
CJ1W-PA205C	100 to 240 VAC	4.6 A	0.8 A	Replacement notification	400 g max.
CJ1W-PA202	100 to 240 VAC	2.8 A	0.4 A	---	200 g max.
CJ1W-PD025	24 VDC	5.0 A	0.8 A	---	335 g max.
CJ1W-PD022	24 VDC (non-insulated type)	2.0 A	0.4 A	---	130 g max.

● Memory Cards

Model	Specifications
HMC-EF183	Flash memory, 128 MB
HMC-EF283	Flash memory, 256 MB
HMC-EF583	Flash memory, 512 MB
HMC-AP001	Memory Card Adapter (for PCMIA slot in personal computer)

● I/O Control Unit

Mode;	Specifications	Current consumption (A)		Weight
		5 VDC	24 VDC	
CJ1W-IC101	Required to connect a CJ-series Expansion Rack to a CJ-series CPU Rack. Must be connected immediately to the right of the CPU Unit. Connect to the I/O Interface Unit (CJ1W-II101) on the first Expansion Rack with a CS/CJ-series I/O Connecting Cable.	0.020 A	---	70 g max.

● End Cover

Model	Specifications	Current consumption (A)	Weight
CJ1W-TER101	Must be connected to the right end of the CPU Rack. (A fatal error will occur if the End Cover is not connected to the right end of the Rack.)*1	Included with CPU Unit and I/O Interface Unit.	---

*1 One End Cover is provided with the CPU Unit and with an I/O Interface Unit.

Others

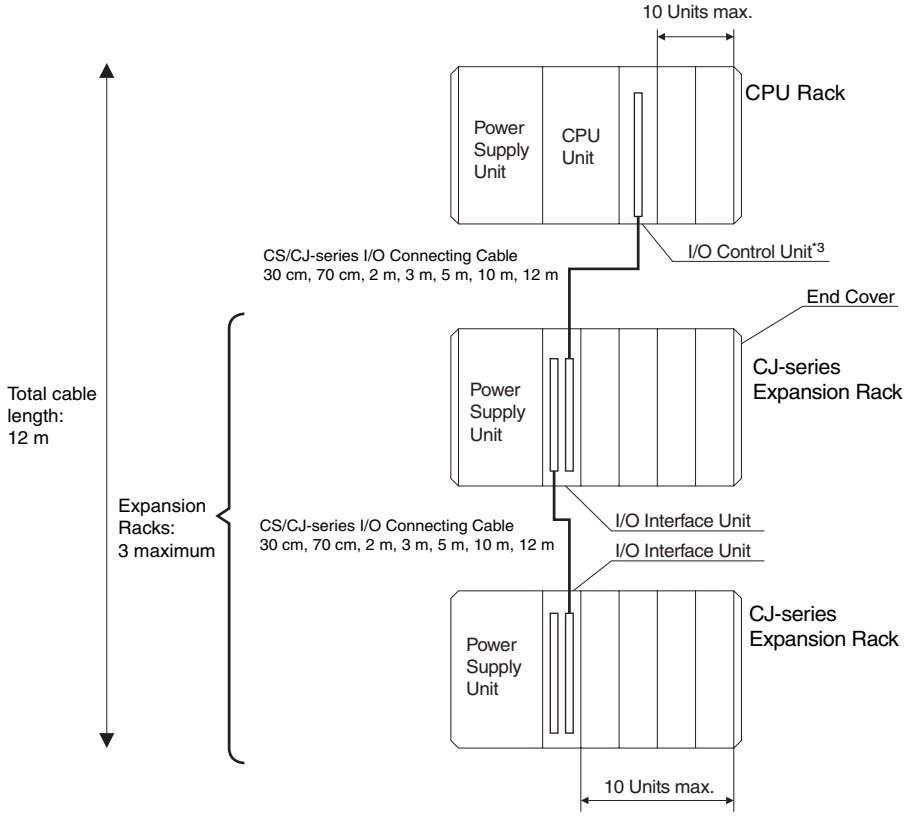
Name	Model	Specifications
DIN Track	PFP-50N	Track length: 50 cm, height: 7.3 mm
	PFP-100N	Track length: 1 m, height: 7.3 mm
	PFP-100N2	Track length: 1 m, height: 16 mm
	PFP-M	Stopper to prevent Units from moving on the track. Two each are provided with the CPU Unit and with an I/O Interface Unit.
Programming Device Connecting Cable for peripheral (USB) port	Commercially available USB cable	USB 2.0 (or 1.1) cable (A connector - B connector), 5.0 m max.
Programming Device Connecting Cables for serial port	XW2Z-200S-CV	Connects to IBM PC/AT computer D-Sub 9-pin connector (Cable length: 2.0 m). Uses static-resistant connector.
	XW2Z-500S-CV	Connects to IBM PC/AT computer D-Sub 9-pin connector (Cable length: 5.0 m). Uses static-resistant connector.
	XW2Z-200S-V	Connects to IBM PC/AT computer D-Sub 9-pin connector. (Cable length: 2.0 m)*1
	XW2Z-500S-V	Connects to IBM PC/AT computer D-Sub 9-pin connector. (Cable length: 5.0 m)*1
Connecting Cable for EtherNet/IP port	Commercially available 100Base-TX twisted-pair cable	Recommended: Fujikura F-LINK-E 0.5 mm × 4P Twisted-pair cable with RJ45 Modular Connectors on both ends. Connect between EtherNet/IP Unit or built-in EtherNet/IP port and switching hub. Use STP (shielded twisted-pair) cable of category 5 or 5e.

Name		Model	Specifications
Communications Adaptor (RS-422A Conversion Adaptor)		CJ1W-CIF11	Current consumption at 5 V: 0.04 A
Battery Set		CJ1W-BAT01	For CJ2 CPU Unit
Support Software	CX-One	CXONE-AL□□C-V□/CXONE-AL□□D-V□	CX-One is an FA Integrated Tool Package that integrates the PLC, network, HMI, components, motion control, and PLC-based process control. • CX-Programmer • CX-Integrator • SwitchBox Utility • CX-Simulator • CX-Protocol • CX-Designer • CX-Thermo • CX-Position • CX-Motion/CX-Motion-NCF/CX-Motion-MCH • CX-Drive • CX-Process Tool • NS Faceplate Auto-Builder • CX-FLnet • Network Configurator

2-1-3 Expansion Racks

CJ-series Expansion Racks can be connected to the CPU Rack to expand the number of Units in the System beyond the CPU Rack. Up to 10 I/O Units can be mounted to each Expansion Rack and a total of 3 Expansion Racks can be connected.

Mount an I/O Control Unit immediately to the right of the CPU Unit, and mount the I/O Interface Unit immediately to the right of the Power Supply Unit on the Expansion Rack. Mounting them in other locations may cause malfunctions.


10 Units max.
CPU Rack
Power Supply Unit
CPU Unit
CS/CJ-series I/O Connecting Cable
30 cm, 70 cm, 2 m, 3 m, 5 m, 10 m, 12 m
I/O Control Unit*3
End Cover
CJ-series Expansion Rack
Power Supply Unit
Total cable length: 12 m
Expansion Racks: 3 maximum
CS/CJ-series I/O Connecting Cable
30 cm, 70 cm, 2 m, 3 m, 5 m, 10 m, 12 m
I/O Interface Unit
I/O Interface Unit
CJ-series Expansion Rack
Power Supply Unit
10 Units max.

CS/CJ-series I/O Connecting Cables

Cable	Length
CS1W-CN313	0.3 m
CS1W-CN713	0.7 m
CS1W-CN223	2 m
CS1W-CN323	3 m
CS1W-CN523	5 m
CS1W-CN133	10 m
CS1W-CN133B2	12 m

Maximum Number of Expansion Racks

Expansion pattern	Maximum number of Racks	Remarks
CJ-series CPU Rack plus CJ-series Expansion Racks	3 Racks	The total length of I/O Connecting Cable between the CPU Rack and an Expansion Rack, and between all Expansion Racks, must be no more than 12 m.

Units

● Units for CJ-series Expansion Racks

Rack	Configuration	Remarks
CJ-series Expansion Racks	CJ-series Power Supply Unit	One required for each Expansion Rack. (An I/O Control Unit is required on the CJ-series CPU Rack.)
	I/O Interface Unit (one End Cover included.)	
	CJ-series Basic I/O Units	A total of up to 10 Units can be connected to the CPU Rack and to each of the Expansion Racks. (An error will occur if 11 or more Units are connected.)
	CJ-series Special I/O Units	
	CJ-series CPU Bus Units	
	End Cover	Must be connected to the right end of the Expansion Rack. (One End Cover is provided with the I/O Interface Unit. A fatal error will occur if the End Cover is not connected.)
	CS/CJ-series I/O Connecting Cable	Required to connect the I/O Interface Unit to the I/O Control Unit or previous I/O Interface Unit.

● CJ-series Power Supply Unit

Model	Power supply voltage	Output capacity		Functions
		5 VDC	24 VDC	
CJ1W-PA205R	100 to 240 VAC	5.0 A	0.8 A	RUN output
CJ1W-PA205C	100 to 240 VAC	4.6 A	0.8 A	Replacement notification
CJ1W-PA202	100 to 240 VAC	2.8 A	0.4 A	
CJ1W-PD025	24 VDC	5.0 A	0.8 A	
CJ1W-PD022	24 VDC (non-insulated type)	2.0 A	0.4 A	

● I/O Interface Unit

Model	Specifications	Current consumption (A)		Weight
		5 VDC	24 VDC	
CJ1W-II101	One Interface Unit is required for each CJ-series Expansion Rack. One End Cover is provided with each Unit.	0.13 A	---	130 g max.*1

*1 Includes the weight of the End Cover.

● End Cover

Model	Specifications	Current consumption (A)	Weight
CJ1W-TER01	Must be connected to the right end of the CPU Rack. (A fatal error will occur if the End Cover is not connected to the right end of the Rack.) One End Cover is provided with the CPU Unit and with an I/O Interface Unit.	Included with the CPU Unit or I/O Interface Unit.	---

● CS/CJ-series I/O Connecting Cables

Model	Specifications	Cable length
CS1W-CN313	An I/O Connecting Cable connects an I/O Control Unit (CJ1W-IC101) to an I/O Interface Unit (CJ1W-II101), or connects an I/O Interface Unit to another I/O Interface Unit.	0.3 m
CS1W-CN713		0.7 m
CS1W-CN223		2 m
CS1W-CN323		3 m
CS1W-CN523		5 m
CS1W-CN133		10 m
CS1W-CN133B2		12 m

2-1-4 Configuration Units

Maximum Number of Units

A maximum of 10 Units can be connected to the CPU Rack for a CJ2 CPU Unit or to an Expansion Rack. There are no restrictions in the number of each model of Unit based on location.

Note A fatal error will occur and the CPU Unit will not operate if more than the allowable number of Units is connected to a CJ2 CPU Rack or to an Expansion Rack.

Models of Configuration Units

The Configuration Units with which the CJ2 CPU Unit can exchange data are classified into three groups. The number of Units that can be mounted depends on the type of Unit.

Units	Description	Unit identification method	Number of mountable Units
Basic I/O Units	Basic I/O Units are used for discrete inputs and outputs.	Identified by the CPU Unit according to mounting position.	No limit
Special I/O Units	Special I/O Units are more advanced than Basic I/O Units. They support functions other than discrete inputs and outputs. Examples: Analog I/O Units and High-speed Counter Units Special I/O Units have a smaller area for exchanging data with the CPU Unit than CPU Bus Units (including Network Communications Units).	Identified by the CPU Unit using unit numbers 0 to 95 set with the rotary switches on the front panel of the Unit.	Up to 96 Special I/O Units can be mounted. (Depending on the model, 1 to 4 unit numbers are used for one Unit.)
CPU Bus Unit	CPU Units are advanced units that exchange data with the CPU Unit via the CPU bus. Examples: Network Communications Units and Serial Communications Units CPU Bus Units have a larger area for exchanging data with the CPU Unit than Special I/O Units.	Identified by the CPU Unit using unit number 0 to F set with the rotary switch on the front panel of the Unit.	Up to 15 CPU Bus Units can be mounted.

Configuration Units

● CJ-series Basic I/O Units

Input Units

Name	Specifications	Model	Number of bits allocated	Current consumption (A)		Weight
				5 VDC	24 VDC	
DC Input Units	Terminal block 12 to 24 VDC, 8 inputs	CJ1W-ID201	16*2	0.08	---	110 g max.
	Terminal block 24 VDC, 16 inputs	CJ1W-ID211	16	0.08	---	110 g max.
	Fujitsu-compatible connector 24 VDC, 32 inputs	CJ1W-ID231*1	32	0.09	---	70 g max.
	MIL connector 24 VDC, 32 inputs	CJ1W-ID232*1	32	0.09	---	70 g max.
	Fujitsu-compatible connector 24 VDC, 64 inputs	CJ1W-ID261*1	64	0.09	---	110 g max.
	MIL connector 24 VDC, 64 inputs	CJ1W-ID262*1	64	0.09	---	110 g max.
AC Input Units	200 to 240 VAC, 8 inputs	CJ1W-IA201	16*2	0.08	---	130 g max.
	100 to 120 VAC, 16 inputs	CJ1W-IA111	16	0.09	---	130 g max.
Interrupt Input Units	24 VDC, 16 inputs	CJ1W-INT01*3	16	0.08	---	110 g max.
Quick-response Input Units	24 VDC, 16 inputs	CJ1W-IDP01	16	0.08	---	110 g max.
B7A Interface Units	64 inputs	CJ1W-B7A14	64	0.09	---	80 g max.

*1 The cable-side connector is not provided with Units equipped with cables. Purchase the cable separately (Refer to *5-3-3 Wiring Basic I/O Units with Connectors*.), or use an OMRON Connector- Terminal Block Conversion Unit or I/O Terminal (Refer to *5-3-4 Connecting to Connector-Terminal Block Conversion Units or I/O Relay Terminals*.).

*2 Although 16 I/O bits are allocated, only 8 of these can be used for external I/O. This Unit is also treated as a 16-point I/O Unit in the I/O tables.

*3 An Interrupt Input Unit can be connected only in a CJ-series CPU Rack. When using the CJ2H-CPU□□-EIP, connect the Interrupt Input Units in slots 0 to 3 in the CPU Rack. An I/O setting error will occur if the Unit is connected in other positions in the CPU Rack or to any position in an Expansion Rack. Up to two Interrupt Input Units can be connected.

Output Units

Name		Specifications	Model	Number of bits allocated	Current consumption (A)		Weight
					5 VDC	24 VDC	
Relay Output Units		Terminal block, 250 VAC/24 VDC, 2 A; 8 points, independent contacts	CJ1W-OC201	16*2	0.09	0.048 (0.006 × Number of ON outputs)	140 g max.
		Terminal block, 250 VAC/24 VDC, 2 A; 16 points	CJ1W-OC211	16	0.11	0.096 (0.006 × Number of ON outputs)	170 g max.
Triac Output Unit		Terminal block, 250 VAC, 0.6 A; 8 points	CJ1W-OA201	16*2	0.22	---	150 g max.
Transistor Output Units	Sinking outputs	Terminal block, 12 to 24 VDC, 2 A; 8 outputs	CJ1W-OD201	16*2	0.09	---	110 g max.
		Terminal block, 12 to 24 VDC, 0.5 A; 8 outputs	CJ1W-OD203	16*2	0.10	---	110 g max.
		Terminal block, 12 to 24 VDC, 0.5 A; 16 outputs	CJ1W-OD211	16	0.10	---	110 g max.
		Fujitsu-compatible connector, 12 to 24 VDC, 0.5 A; 32 outputs	CJ1W-OD231*1	32	0.14	---	70 g max.
		MIL connector, 12 to 24 VDC, 0.3 A; 32 outputs	CJ1W-OD233*1	32	0.14	---	70 g max.
		Fujitsu-compatible connector, 12 to 24 VDC, 0.3 A; 64 outputs	CJ1W-OD261*1	64	0.17	---	110 g max.
		MIL connector, 12 to 24 VDC, 0.3 A; 64 outputs	CJ1W-OD263*1	64	0.17	---	110 g max.
	Sourcing outputs	Terminal block, 24 VDC, 2 A; 8 outputs, load short-circuit protection and disconnected line detection	CJ1W-OD202	16*2	0.11	---	120 g max.
		Terminal block, 24 VDC, 0.5 A; 8 outputs, load short-circuit protection	CJ1W-OD204	16*2	0.10	---	120 g max.
		Terminal block, 24 VDC, 0.5 A; 16 outputs, load short-circuit protection	CJ1W-OD212	16	0.10	---	120 g max.
		MIL connector, 24 VDC, 0.5 A; 32 outputs, load short-circuit protection	CJ1W-OD232*1	32	0.15	---	80 g max.
		MIL connector, 12 to 24 VDC, 0.3 A; 64 outputs	CJ1W-OD262*1	64	0.17	---	110 g max.
B7A Interface Units		64 outputs	CJ1W-B7A04	64	0.07	---	80 g max.

*1 The cable-side connector is not provided with Units equipped with cables. Purchase the cable separately (Refer to *5-3-3 Wiring Basic I/O Units with Connectors*.), or use an OMRON Connector- Terminal Block Conversion Unit or I/O Terminal (Refer to *5-3-4 Connecting to Connector-Terminal Block Conversion Units or I/O Relay Terminals*.).

*2 Although 16 I/O bits are allocated, only 8 of these can be used for external I/O. This Unit is also treated as a 16-point I/O Unit in the I/O tables.

Mixed I/O Units

Name		Specifications	Model	Number of bits allocated	Current consumption (A)		Weight
					5 VDC	24 VDC	
24-VDC Input/ Transistor Output Units	Sinking	Fujitsu-compatible connector Inputs: 24 VDC, 16 inputs Outputs: 12 to 24 VDC, 0.5 A; 16 outputs	CJ1W-MD231*1	32	0.13	---	90 g max.
		Fujitsu-compatible connector Inputs: 24 VDC, 32 inputs Outputs: 12 to 24 VDC, 0.3 A; 32 outputs	CJ1W-MD261*1	64	0.14	---	110 g max.
		MIL connector Inputs: 24 VDC, 16 inputs Outputs: 12 to 24 VDC, 0.5 A; 16 outputs	CJ1W-MD233*1	32	0.13	---	90 g max.
		MIL connector Inputs: 24 VDC, 32 inputs Outputs: 12 to 24 VDC, 0.3 A; 32 outputs	CJ1W-MD263*1	64	0.14	---	110 g max.
	Sourcing	MIL connector Inputs: 24 VDC, 16 inputs Outputs: 24 VDC, 0.5 A; 16 outputs Load-short circuit protection	CJ1W-MD232*1	32	0.13	---	80 g max.
TTL I/O Units		MIL connector Inputs: TTL (5 VDC), 32 inputs Outputs: TTL (5 VDC, 35 mA), 32 outputs	CJ1W-MD563*1	64	0.19	---	110 g max.
B7A Interface Units		32 inputs, 32 outputs	CJ1W-B7A22	64	0.07	---	80 g max.

*1 The cable-side connector is not provided with Units equipped with cables. Purchase the cable separately (Refer to *5-3-3 Wiring Basic I/O Units with Connectors*.), or use an OMRON Connector- Terminal Block Conversion Unit or I/O Terminal (Refer to *5-3-4 Connecting to Connector-Terminal Block Conversion Units or I/O Relay Terminals*.).

● CJ-series Special I/O Units

Type	Name	Specifications	Model	Number of words allocated (CIO 2000 to CIO 2959)	Number of words allocated (D20000 to D29599)	Unit No.	Current consumption (A)		Weight
							5 VDC	24 VDC	
Special I/O Units	General-purpose Universal Analog Input Unit	4 inputs, fully universal	CJ1W-AD04U	10 words	100 words	0 to 95	0.32	---	150 g max.
	Analog Input Units	8 inputs (4 to 20 mA, 1 to 5 V, etc.)	CJ1W-AD081-V1	10 words	100 words	0 to 95	0.42	---	140 g max.
		4 inputs (4 to 20 mA, 1 to 5 V, etc.)	CJ1W-AD041-V1	10 words	100 words	0 to 95	0.42	---	140 g max.
	Analog Output Units	4 outputs (1 to 5 V, 4 to 20 mA, etc.)	CJ1W-DA041	10 words	100 words	0 to 95	0.12	---	150 g max.
		2 outputs (1 to 5 V, 4 to 20 mA, etc.)	CJ1W-DA021	10 words	100 words	0 to 95	0.12	---	150 g max.
		8 outputs (1 to 5 V, 0 to 10 V, etc.)	CJ1W-DA08V	10 words	100 words	0 to 95	0.14	---	150 g max.
		8 outputs (4 to 20 mA)	CJ1W-DA08C	10 words	100 words	0 to 95	0.14	---	150 g max.
	Analog I/O Unit	4 inputs (1 to 5 V, 4 to 20 mA, etc.) 4 outputs (1 to 5 V, 4 to 20 mA, etc.)	CJ1W-MAD42	10 words	100 words	0 to 95	0.58	---	150 g max.
	Isolated-type High-resolution Universal Input Unit	4 inputs, fully universal Resolution: 1/256,000, 1/64,000, 1/16,000	CJ1W-PH41U	10 words	100 words	0 to 95	0.30	---	150 g max.
	Isolated-type Thermocouple Input Units	4 thermocouple inputs	CJ1W-PTS51	10 words	100 words	0 to 95	0.25	---	150 g max.
		2 thermocouple inputs	CJ1W-PTS15	10 words	100 words	0 to 95	0.18	---	150 g max.
	Isolated-type Resistance Thermometer Input Units	4 resistance thermometer inputs	CJ1W-PTS52	10 words	100 words	0 to 95	0.25	---	150 g max.
		2 resistance thermometer inputs	CJ1W-PTS16	10 words	100 words	0 to 95	0.18	---	150 g max.
	Direct Current Input Unit	DC voltage or DC current, 2 inputs	CJ1W-PDC15	10 words	100 words	0 to 95	0.18	---	150 g max.
	Temperature Control Units	4 control loops, thermocouple inputs, NPN outputs	CJ1W-TC001	20 words	200 words	0 to 94 (uses words for 2 unit numbers)	0.25	---	150 g max.
		4 control loops, thermocouple inputs, PNP outputs	CJ1W-TC002	20 words	200 words	0 to 94 (uses words for 2 unit numbers)	0.25	---	150 g max.
		2 control loops, thermocouple inputs, NPN outputs, heater burnout detection	CJ1W-TC003	20 words	200 words	0 to 94 (uses words for 2 unit numbers)	0.25	---	150 g max.
		2 control loops, thermocouple inputs, PNP outputs, heater burnout detection	CJ1W-TC004	20 words	200 words	0 to 94 (uses words for 2 unit numbers)	0.25	---	150 g max.
		4 control loops, temperature- resistance thermometer inputs, NPN outputs	CJ1W-TC101	20 words	200 words	0 to 94 (uses words for 2 unit numbers)	0.25	---	150 g max.

Type	Name	Specifications	Model	Number of words allocated (CIO 2000 to CIO 2959)	Number of words allocated (D20000 to D29599)	Unit No.	Current consumption (A)		Weight
							5 VDC	24 VDC	
Special I/O Units	Temperature Control Units	4 control loops, temperature- resistance thermometer inputs, PNP outputs	CJ1W-TC102	20 words	200 words	0 to 94 (uses words for 2 unit numbers)	0.25	---	150 g max.
		2 control loops, temperature-resistance thermometer inputs, NPN outputs, heater burnout detection	CJ1W-TC103	20 words	200 words	0 to 94 (uses words for 2 unit numbers)	0.25	---	150 g max.
		2 control loops, temperature-resistance thermometer inputs, PNP outputs, heater burnout detection	CJ1W-TC104	20 words	200 words	0 to 94 (uses words for 2 unit numbers)	0.25	---	150 g max.
	Position Control Units	1 axis, pulse output; open collector output	CJ1W-NC113	10 words	100 words	0 to 95	0.25	---	100 g max.
		2 axes, pulse outputs; open collector outputs	CJ1W-NC213	10 words	100 words	0 to 95	0.25	---	100 g max.
		4 axes, pulse outputs; open collector outputs	CJ1W-NC413	20 words	200 words	0 to 94 (uses words for 2 unit numbers)	0.36	---	150 g max.
		1 axis, pulse output; line driver output	CJ1W-NC133	10 words	100 words	0 to 95	0.25	---	100 g max.
		2 axes, pulse outputs; line driver outputs	CJ1W-NC233	10 words	100 words	0 to 95	0.25	---	100 g max.
		4 axes, pulse outputs; line driver outputs	CJ1W-NC433	20 words	200 words	0 to 94 (uses words for 2 unit numbers)	0.36	---	150 g max.
		Space Unit*1	CJ1W-SP001	None	None	---	0.56	---	50 g max.
	ID Sensor Units	V600-series single-head type	CJ1W-V600C11	10 words	100 words	0 to 95	0.26	0.12	120 g max.
		V600-series two-head type	CJ1W-V600C12	20 words	200 words	0 to 94 (uses words for 2 unit numbers)	0.32	0.24	130 g max.
		V680-series single-head type	CJ1W-V680C11	10 words	100 words	0 to 95	0.26	0.13	120 g max.
		V680-series two-head type	CJ1W-V680C12	20 words	200 words	0 to 94	0.32	0.26	130 g max.
	High-speed Counter Unit	Two-axis pulse input, counting rate: 500 kcps max., line driver compatible	CJ1W-CT021	40 words	400 words	0 to 92 (uses words for 4 unit numbers)	0.28	---	100 g max.
	CompoNet Master Unit	CompoNet remote I/O: 2,048 words, 512 bits max.	CJ1W-CRM21	10 words	100 words	0 to 95	0.40	---	130 g max.
	CompoBus/S Master Units	CompoBus/S remote I/O, 256 bits max.	CJ1W-SRM21	10 words or 20 words	None	0 to 95 or 0 to 94	0.15	---	66 g max.*2

Type	Name	Specifications	Model	Number of words allocated (CIO 2000 to CIO 2959)	Number of words allocated (D20000 to D29599)	Unit No.	Current consumption (A)		Weight
							5 VDC	24 VDC	
Special I/O Units	CompoNet Master Unit	CompoNet remote I/O	CJ1W-CRM21						130 g max.
		Communications mode No. 0: 128 inputs/128 outputs for Word Slaves		20 words	None	0 to 94 (uses words for 2 unit numbers)	0.40	---	
		Communications mode No. 1: 256 inputs/256 outputs for Word Slaves		40 words	None	0 to 92 (uses words for 4 unit numbers)	0.40	---	
		Communications mode No. 2: 512 inputs/512 outputs for Word Slaves		80 words	None	0 to 88 (uses words for 8 unit numbers)	0.40	---	
		Communications mode No. 3: 256 inputs/256 outputs for Word Slaves and 128 inputs/128 outputs for Bit Slaves		80 words	None	0 to 88 (uses words for 8 unit numbers)	0.40	---	
		Communications mode No. 8: 1,024 inputs/ 1,024 outputs for Word Slaves and 256 inputs/256 outputs for Bit Slaves maximum		10 words	Depends on setting	0 to 95 uses words for 1 unit number)	0.40	---	

*1 The Space Unit is for Position Control Units.

*2 Includes the weight of accessory connectors.

● CJ-series CPU Bus Units

Type	Name	Specifications	Model	Number of words allocated (CIO 1500 to CIO 1899)	Unit No.	Current consumption (A)		Weight
						5 VDC	24 VDC	
CPU Bus Units*2	High-speed Analog Input Unit	4 inputs: 80 μs/2 inputs, 160 μs/4 inputs	CJ1W-ADG41	25 words	0 to F	0.65	---	150 g max.
	Controller Link Units	Wired data links	CJ1W-CLK23	25 words	0 to F	0.35	---	110 g max.
	Serial Communications Units	One RS-232C port and one RS-422A/485 port	CJ1W-SCU41-V1	25 words	0 to F	0.38*3	---	110 g max.
		Two RS-232C ports	CJ1W-SCU21-V1			0.28*3		
		Two RS-422A/485 ports	CJ1W-SCU31-V1			0.38		
	Ethernet Units	100Base-TX, FINS communications, socket service, FTP server, and mail communications	CJ1W-ETN21	25 words	0 to F (4 Units max.)	0.38	---	110 g max.
CPU Bus Units*2	EtherNet/IP Unit	Tag data links, FINS communications, CIP message communications, FTP server, etc.	CJ1W-EIP21	25 words	0 to F	0.41	---	94 g max.
	FL-net Unit	100Base-TX cyclic transmissions and message transmissions	CJ1W-FLN22	25 words	0 to F (4 Units max.)	0.37	---	100 g max.
	DeviceNet Unit	DeviceNet remote I/O, 2,048 points; Both Master and Slave functions, Automatic allocation possible without Configurator	CJ1W-DRM21	25 words*1	0 to F	0.29	---	118 g max.*5
	Position Control Units supporting MECHATROLINK-II communications	MECHATROLINK-II, 16 axes max.	CJ1W-NCF71	25 words	0 to F	0.36	---	95 g max.
	Motion Control Units supporting MECHATROLINK-II communications*4	MECHATROLINK-II, Real axes: 30 max., Virtual axes: 2 max., Special motion control language	CJ1W-MCH71	25 words	0 to F	0.60	0.80	210 g max.
	SYSMAC SPU Unit (High-speed Storage and Processing Unit)	One CF card type I/II slot (used with OMRON HMC-EF□□□ Memory Card), one Ethernet port	CJ1W-SPU01-V2*6	Not used.	0 to F	0.56	---	180 g max.

*1 Slave I/O are allocated in DeviceNet Area (CIO 3200 to CIO 3799).

*2 Some CJ-series CPU Bus Units are allocated words in the CPU Bus Unit Setting Area. The system must be designed so that the number of words allocated in the CPU Bus Unit Setting Area does not exceed its capacity. Refer to *4-6-2 Procedure for Setting CPU Bus Unit Setup Area* in the *CJ2 CPU Unit Software User's Manual* (Cat. No. W473).

*3 Increases by 0.15 A/Unit when an NT-AL001 RS-232C/RS-422A Link Adapter is used. Increases by 0.04 A/Unit when a CJ1W-CIF11 RS-422A Conversion Unit is used.

*4 When mounting to a CJ-series CPU Rack or a CJ-series Expansion Rack, one of these Units uses the space of three Units.

*5 Includes the weight of accessory connectors.

*6 Use version 2 or higher of the SYSMAC SPU Unit with a CJ2 CPU Unit.

2-1-5 Calculating Unit Current Consumption

The amount of current/power that can be supplied to the Units mounted in a Rack is limited by the capacity of the Rack's Power Supply Unit. Refer to the following tables when designing your system so that the total current consumption of the mounted Units does not exceed the maximum current for each voltage group and the total power consumption does not exceed the maximum for the Power Supply Unit.

For details on calculating the current consumption of Units, refer to *2-1-2 CPU Rack*, *2-1-3 Expansion Racks*, and *2-1-4 Configuration Units*.

Maximum Current and Power Supplied by Power Supply Units

The following table shows the maximum currents and power that can be supplied by Power Supply Units in CPU Racks and Expansion Racks.

Note 1 When calculating current/power consumption in a CPU Rack, be sure to include the power required by the CPU Unit itself, as well as the I/O Control Unit if one or more Expansion Racks is connected.

2 Be sure to include the power required by the I/O Interface Unit when calculating current/power consumption in an Expansion Rack.

Power Supply Unit	Max. current consumption			Max. total power consumption
	5-V group (internal logic)	24-V group (relays)	24-V group (service)	
CJ1W-PA205R	5.0 A	0.8 A	None	25 W
CJ1W-PA205C	5.0 A	0.8 A	None	25 W
CJ1W-PA202	2.8 A	0.4 A	None	14 W
CJ1W-PD025	5.0 A	0.8 A	None	25 W
CJ1W-PD022	2.0 A	0.4 A	None	19.6 W

Example Calculations

Example 1: In this example, the following Units are mounted to a CPU Rack with a CJ1WPA205R Power Supply Unit.

Unit	Model	Quantity	Voltage group	
			5-V	24-V
CPU Unit	CJ2H-CPU68-EIP	1	0.820 A	---
I/O Control Unit	CJ1W-IC101	1	0.020 A	---
Input Units	CJ1W-ID211	2	0.080 A	---
	CJ1W-ID231	2	0.090 A	---
Output Unit	CJ1W-OC201	2	0.090 A	0.048 A
Special I/O Unit	CJ1W-DA041	1	0.120 A	---
CPU Bus Unit	CJ1W-CLK23	1	0.350 A	---
Current consumption	Calculation		0.820 A + 0.020 + 0.080 × 2 + 0.090 × 2 + 0.090 × 2 + 0.120 + 0.350	0.048 × 2
	Result		1.83 A (≤5.0 A)	0.096 A (≤0.8 A)
Power consumption	Calculation		2.51 × 5 V = 9.15 W	0.096 A × 24 V = 2.304 W
	Result		9.15 + 2.30 = 11.45 W (≤25 W)	

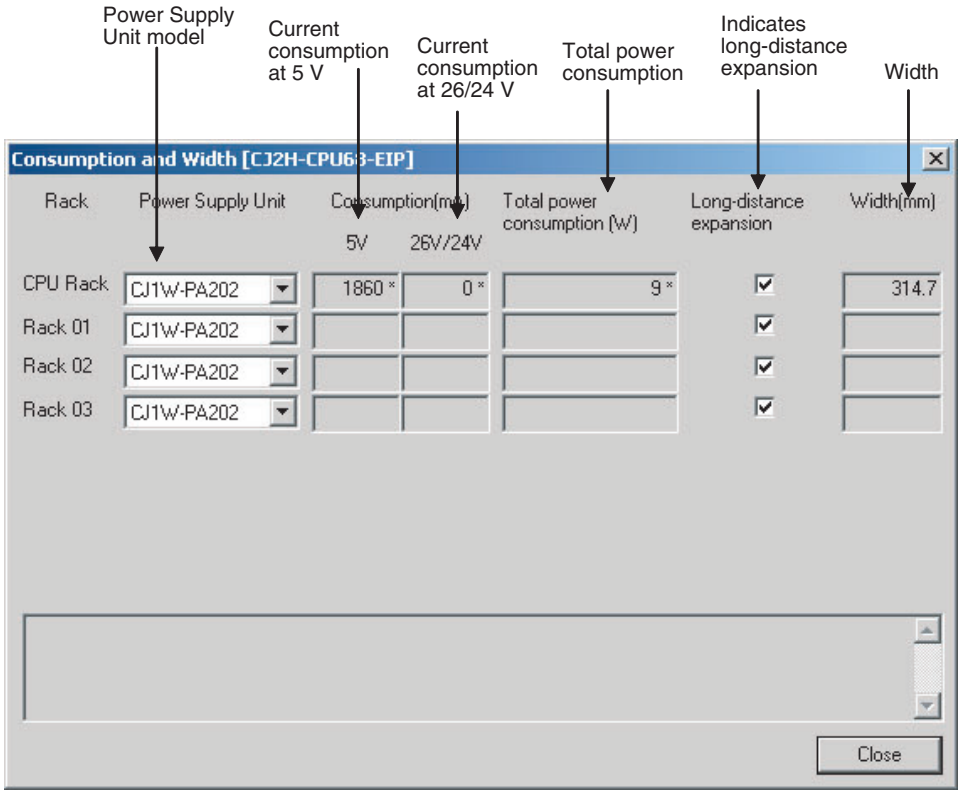
Example 2: In this example, the following Units are mounted to a CJ-series Expansion Rack with a CJ1W-PA205R Power Supply Unit.

Unit	Model	Quantity	Voltage group	
			5-V	24-V
I/O Interface Unit	CJ1W-II101	1	0.130 A	---
Input Unit	CJ1W-ID211	2	0.080 A	---
Output Unit	CJ1W-OD231	8	0.140 A	---
Current consumption	Calculation		0.130 + 0.080 × 2 + 0.140 × 8	---
	Result		1.41 A (≤5.0 A)	---
Power consumption	Calculation		1.41 × 5 V = 7.05 W	---
	Result		7.05 W (≤25 W)	

Additional Information

Rack Current Consumption and Width Display

To display the current consumption and width of Units connected in the CPU Rack or Expansion Rack, select ***Current Consumption and Width*** from the Options Menu in the CJ2 CPU Unit I/O Table Window.



If the capacity of a Power Supply Unit is exceeded, it will be displayed in red.

2-1-6 Calculating Power Consumption

The ambient operating temperature at the control panel for mounting a CJ-series PLC must be no higher than 55°C. This section describes how to calculate the power consumption of a CPU Rack for use in the thermal design of the control panel.

Calculating Power Consumption

Use the following equation to calculate the average power consumption (W) of a CJ-series CPU Rack.

$W = W\_PLC + W\_IO\_ONOFF$

- W_IO_ONOFF: Basic I/O Unit power consumption
- W_PLC: Basic PLC power consumption

● Basic PLC Power Consumption (W_PLC)

The basic PLC power consumption is calculated based on the overall power consumption of the PLC and the power conversion rate of the Power Supply Unit.

$W\_PLC = W\_unit \div \eta$

- W_unit:
  Total power consumption of Units mounted to the CPU Rack. For details on the current consumption and voltage of individual Units, refer to ???.
- η:
  Power Supply Unit power conversion rate.

The rate is 70% for the CJ Series, so use “0.7” in the calculation.

● Basic I/O Unit Power Consumption (W_IO_ONOFF)

The Basic I/O Unit power consumption is the total consumption for the Input Units and the Output Units.

- Input Units

Rated input voltage × Input current × Number of input points

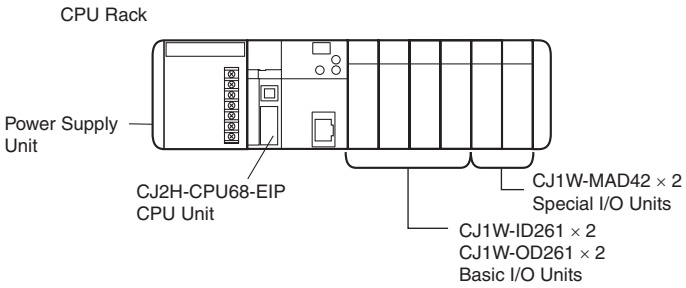
- Output Units

Residual voltage × Maximum load current × Number of output points

Note For the CJ Series, calculate the residual voltage at 0.1 V.

Calculation Examples

These examples show how to calculate the power consumption (W) for the following system.



Units	Model	Quantity	5 VDC	Other
CPU Unit	CJ2H-CPU68-EIP	1 Unit	0.82 A	---
Input Units	CJ1W-ID261	2 Units	0.09 A	Rated input voltage: 24 V Input current: 4.1 mA Number of input points: 64
Output Unit	CJ1W-OD261	2 Units	0.17 A	Residual voltage: 0.1 V Maximum load current: 0.3 A Number of output points: 64
Special I/O Units	CJ1W-MAD42	2 Units	0.58 A	---

● Basic PLC Power Consumption (W_PLC)

W_PLC = (0.82 + 0.09 × 2 + 0.17 × 2 + 0.58 × 2)A × 5 V ÷ 0.7= 17.86 W

● Basic I/O Unit Power Consumption (W_IO_ONOFF)

W_IO_ONOFF = 24 V × 0.0041 A x 128 points + 0.1 × 0.3 A × 128 points = 16.43 W

● Average Power Consumption (W)

W = W_PLC + W_IO_ONOFF = 34.29 W

2-2 Expanded System Configuration

This section describes the system configurations that can be connected by using the serial port that is built into the CJ2 CPU Unit, along with Communications Units and other Configuration Units.

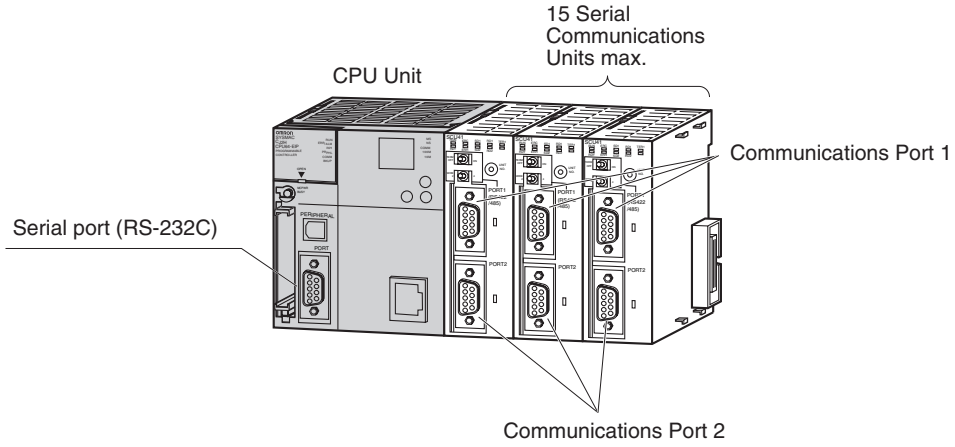
2-2-1 Serial Communications

This expanded system can be connected via the CJ2 CPU Unit's built-in serial communications port or a Serial Communications Unit.

Various protocols, including Host Link and NT Link, can be used with the serial communications port. A particular protocol can be supported by switching the mode of the serial communications port.

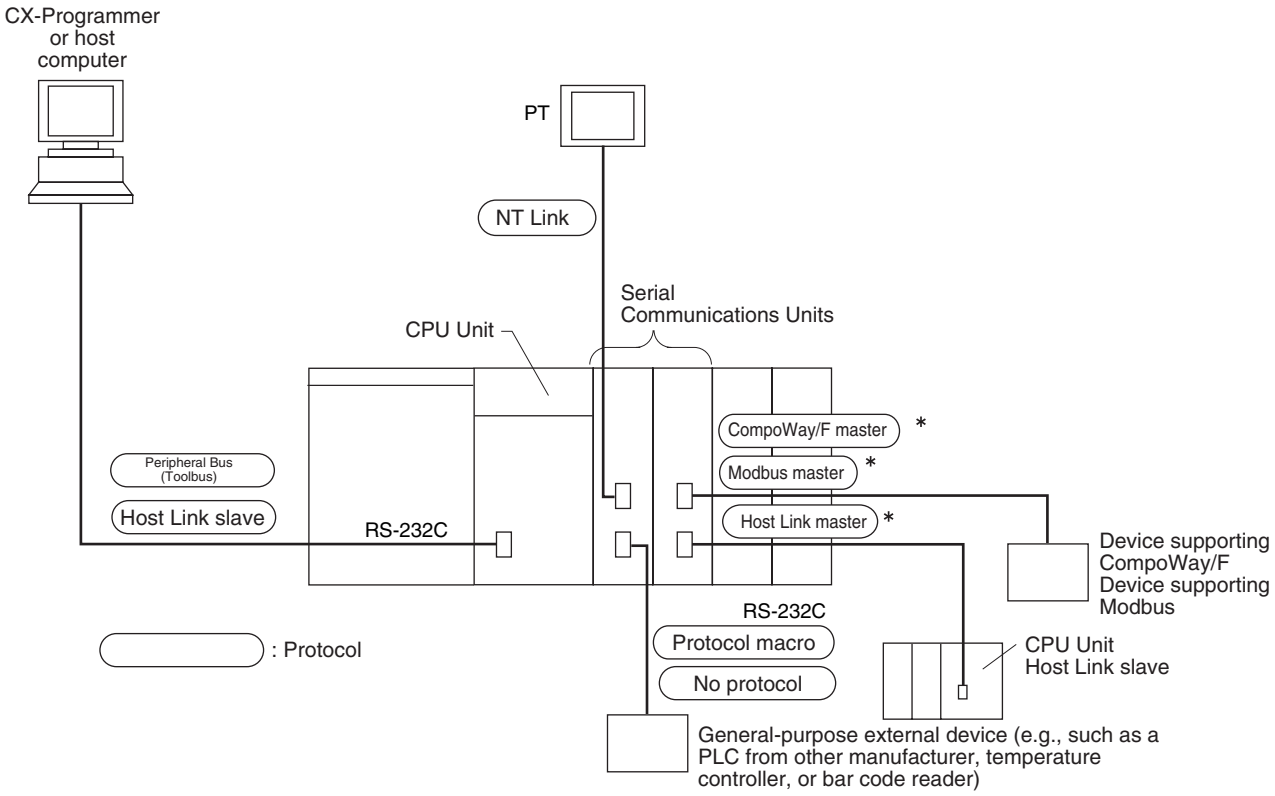
For details on the serial communications modes that are supported, refer to the *CJ2 CPU Unit Software User's Manual* (Cat. No. W473).

Note Protocol macros are supported only for Serial Communications Units.



System Configuration Example

The host computer or a Programming Device such as the CX-Programmer is connected via the built-in serial communications port on the CPU Unit. In addition, up to 15 Serial Communications Units can be connected to a single CPU Unit, making it possible to configure a flexible serial communications system by connecting devices with RS-232C or RS-422/485 ports (such as PLCs from other manufacturers, temperature controllers, bar code readers, ID systems, personal computers, board computers, and components).



* This is connected using the Serial Gateway. The Serial Gateway is supported for Serial Communications Units with unit version 1.2 or later.

For details on the protocol modes that can be selected for each port, refer to *11-2-1 Overview of Serial Communications* in the *CJ2 CPU Unit Software User's Manual* (Cat. No. W473).

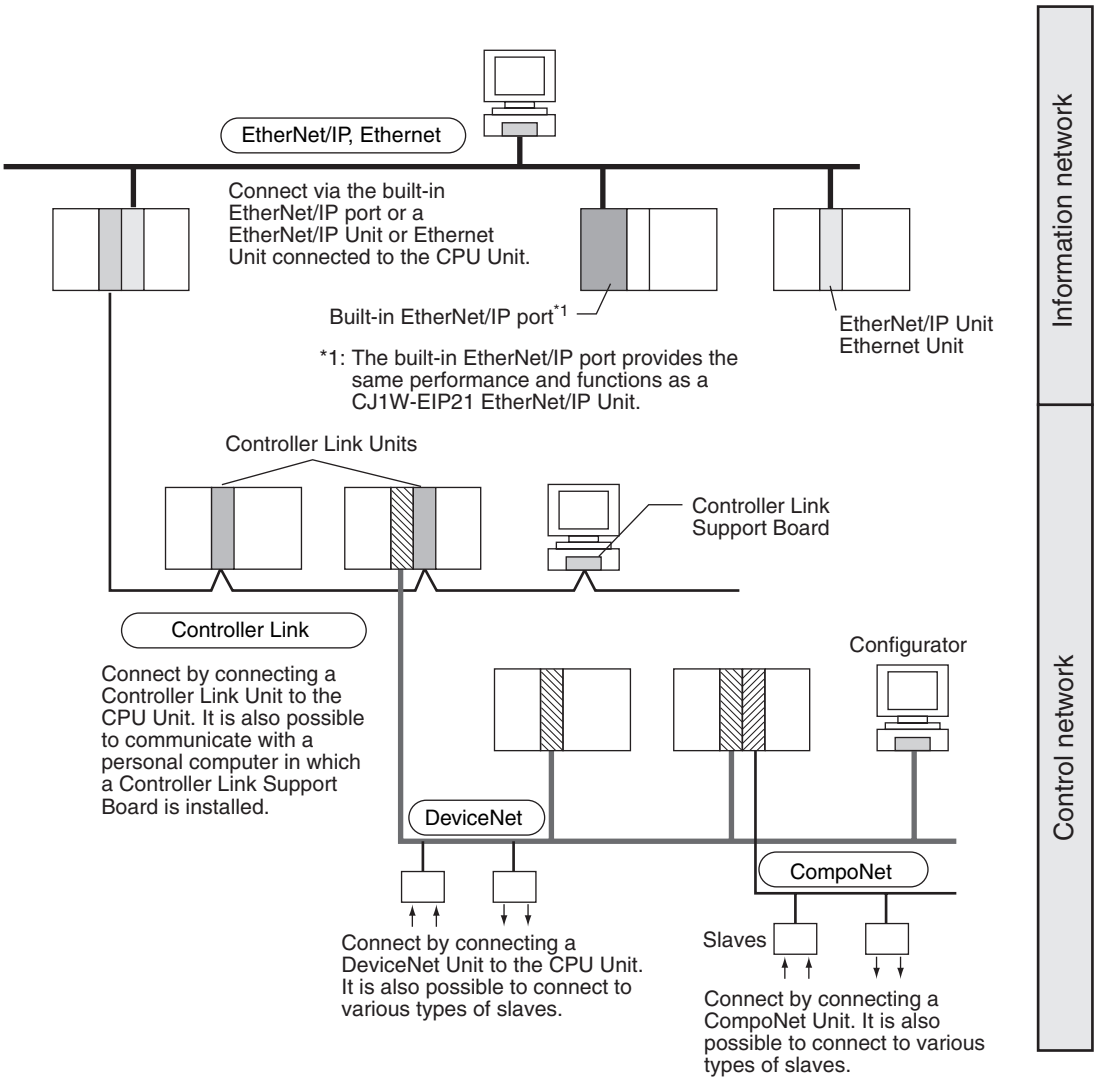
Additional Information

Use the Peripheral Bus to connect the CJ2 CPU Unit to the CX-Programmer via serial communications.

2-2-2 Communications Networks

Communications Network Systems

The CJ Series supports the following communications networks. Select the appropriate network according to the applications. For details on communications networks, refer to *11-3 Communications Networks* in the *CJ2 CPU Unit Software User's Manual* (Cat. No. W473).


Information network
Control network
EtherNet/IP, Ethernet
Connect via the built-in EtherNet/IP port or a EtherNet/IP Unit or Ethernet Unit connected to the CPU Unit.
Built-in EtherNet/IP port*1
EtherNet/IP Unit
Ethernet Unit
*1: The built-in EtherNet/IP port provides the same performance and functions as a CJ1W-EIP21 EtherNet/IP Unit.
Controller Link Units
Controller Link Support Board
Controller Link
Connect by connecting a Controller Link Unit to the CPU Unit. It is also possible to communicate with a personal computer in which a Controller Link Support Board is installed.
Configurator
DeviceNet
CompoNet
Slaves
Connect by connecting a DeviceNet Unit to the CPU Unit. It is also possible to connect to various types of slaves.
Connect by connecting a CompoNet Unit. It is also possible to connect to various types of slaves.

Communications Network Overview

System	Network	Function	Communications	Communications Device
Information networks	EtherNet/IP	Between Host computer and PLC.	FINS message communications	Built-in EtherNet/IP port
		Between PLCs.		
		Between Host computer and Memory Card installed in CPU Unit.	FTP server	
	Controller Link	Between PLC and personal computer directly connected to the Network.	FINS message communications	Controller Link Support Board or Controller Link Unit
			Data link (offset, simple settings)	
	RS-232C → Controller Link	Between Host Link computer and PLC on the Network.	Host Link commands and gateway.	RS-232C cables and Controller Link Unit
Control networks	EtherNet/IP	Between PLCs.	Tag data links	Built-in EtherNet/IP port
	Controller Link	Between PLCs.	FINS message communications	Controller Link Unit
			Data link (offset, simple settings)	
	DeviceNet		FINS message communications in an open network.	DeviceNet Master Unit and Configurator
	DeviceNet	PLC and Network devices (Slaves).	Large-capacity remote I/O (fixed or free allocation) in an open network	DeviceNet Master Unit and Configurator
	CompoNet		High-speed, multi-point, multi-node remote I/O in an open network	CompoNet Master Unit

3

Nomenclature and Functions

This section gives the parts of a CJ2 PLC and describes the functions of the parts.

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- 3-1-2 Built-in EtherNet/IP Section 3-7

3-2 Memory Card 3-12
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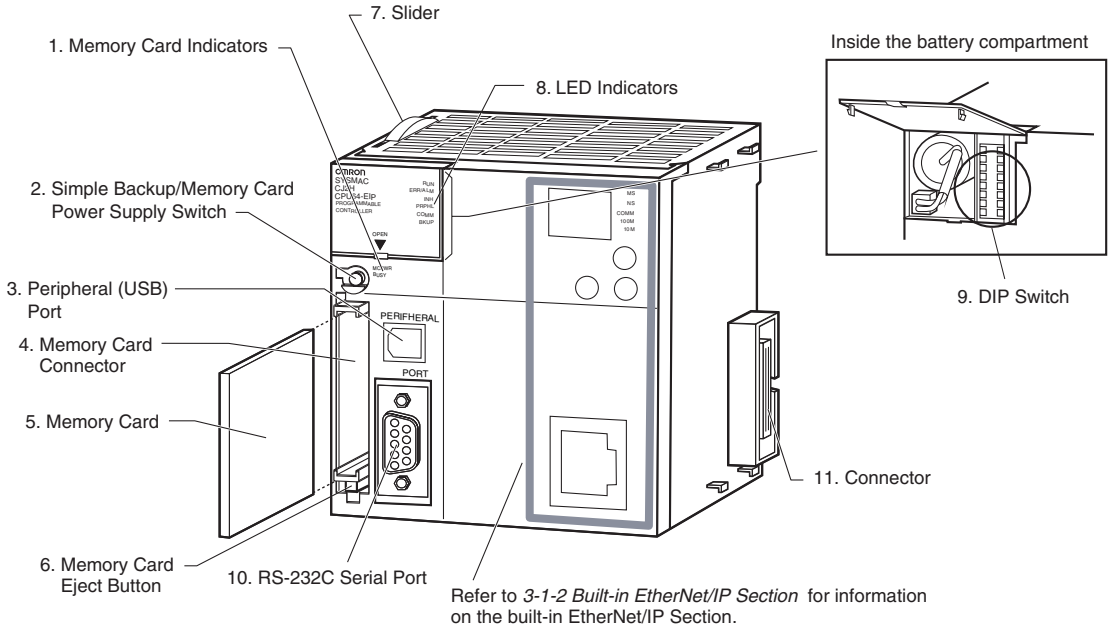
3-4 CJ-series Basic I/O Units 3-23
- 3-4-1 Basic I/O Units with Terminal Blocks 3-23
- 3-4-2 Thirty-two/Sixty-four-point Basic I/O Units with Connectors 3-25

3-5 I/O Control Units and I/O Interface Units 3-26
- 3-5-1 Component Names 3-26
- 3-5-2 System Configuration 3-26

3-1 CPU Units

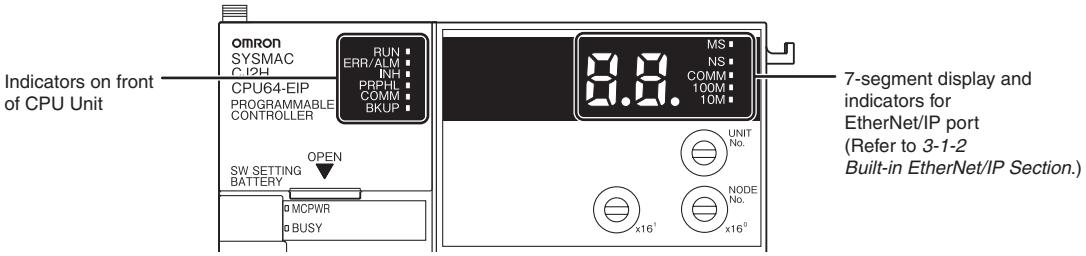
3-1-1 CPU Section

Components and Functions


7. Slider
1. Memory Card Indicators
8. LED Indicators
Inside the battery compartment
2. Simple Backup/Memory Card Power Supply Switch
3. Peripheral (USB) Port
4. Memory Card Connector
5. Memory Card
9. DIP Switch
11. Connector
6. Memory Card Eject Button
10. RS-232C Serial Port
Refer to 3-1-2 Built-in EtherNet/IP Section for information on the built-in EtherNet/IP Section.

1. Memory Card Indicators (Refer to *3-2 Memory Card*.)
   Indicates the Memory Card status (access and power supply).
2. Simple Backup/Memory Card Power Supply Switch (Refer to *3-2 Memory Card*.)
   Used to back up Memory Card data or turn OFF the power when removing the Memory Card.
3. Peripheral (USB) Port
   Connected to Programming Devices, such as the CX-Programmer
4. Memory Card Connector (Refer to *3-2 Memory Card*.)
   Connects the Memory Card to the CPU Unit.
5. Memory Card (Refer to *3-2 Memory Card*.)
   All CPU Unit data can be copied to a Memory Card to back up the data. If a Memory Card Adapter is used, the Memory Card can be mounted in the PCMIA slot in a personal computer.
6. Memory Card Eject Button (Refer to *3-2 Memory Card*.)
   Press the eject button to remove the Memory Card from the CPU Unit.
7. Slider
   Secures the CPU Unit to the next Unit.
8. LED Indicators (Refer to the next page.)
   These indicators show the status of the CPU Unit:
   - Normal operation
   - Errors
   - Output OFF status
   - Communications status for the peripheral (USB) and RS-232C ports
   - Backup status between RAM and built-in flash memory
9. DIP Switch (Refer to a following page.)
   Sets operations, such as user memory protection, automatic program transfer by Memory Card, serial port communications mode, and simple backup.
10. RS-232C Serial Port (Refer to *A-4 Connecting to the RS-232C Serial Port on the CPU Unit*.)
    Connected to Programming Devices, Host Computers, general-purpose external devices, Programmable Terminals, and other devices.
11. Connector
    Connected to the next Unit.

CPU Unit Status Indicators



The CJ2 CPU Unit status can be checked with the indicators at the top of the front panel of the Unit. The following table describes these indicators.

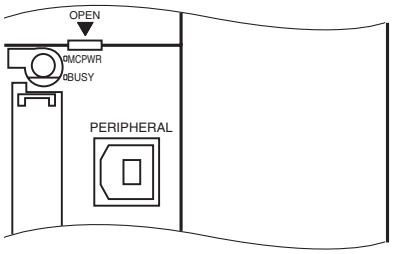
Indicator	Color	Status	Meaning
RUN	Green	ON	Lights when the PLC is operating normally in MONITOR or RUN mode. The program is being executed.
		Flashing	System download mode error or DIP switch settings error.
		OFF	PLC has stopped operating while in PROGRAM mode, or has stopped operating due to a fatal error, or is downloading data from the system.
ERR/ALM	Red	ON	A fatal error (including FALS(007) instruction execution) or a hardware error (watchdog timer error) was found in self-diagnosis. The CJ2 CPU Unit will stop operating, and the outputs from all Output Units will turn OFF.
		Flashing	A non-fatal error was found (including FAL(006) instruction execution) in the self-diagnosis. The CJ2 CPU Unit will continue operating.
		OFF	The CJ2 CPU Unit is operating normally.
INH	Yellow	ON	Output OFF Bit (A500.15) has been turned ON. The outputs from all Output Units will turn OFF.
		OFF	Output OFF Bit (A500.15) has been turned OFF.
PRPHL	Yellow	Flashing	The CJ2 CPU Unit is communicating (sending or receiving) via the peripheral (USB) port.
		OFF	The CJ2 CPU Unit is not communicating via the peripheral (USB) port.
COMM	Yellow	Flashing	The CJ2 CPU Unit is communicating (sending or receiving) via the serial port (RS-232C).
		OFF	The CJ2 CPU Unit is not communicating via the serial port (RS-232C).
BKUP	Yellow	ON	User program and parameter area data is being backed up to flash memory in the CPU Unit or being restored from flash memory after the power supply to the PLC was turned ON. *1
		OFF	Data is not being written to flash memory.

*1 Do not turn OFF the power supply to the PLC while this indicator is lit.

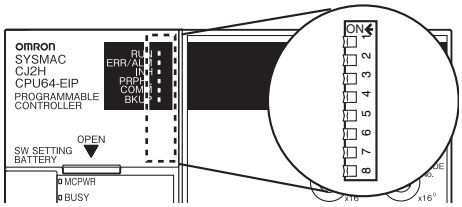
Memory Card Indicators

The status of a Memory Card mounted in the CJ2 CPU Unit can be checked with the indicators in the middle of the front panel of the Unit. The following table describes these indicators.

Indicator	Color	Status	Meaning
MCPWR	Green	Lit	Power is being supplied to the Memory Card.
		Flashing	Flashes once: Simple backup read, write, or verify normal Flashes five times: Simple backup read malfunction Flashes continuously: Simple backup write or verify malfunction
		Not lit	Power is not being supplied to the Memory Card.
BUSY	Yellow	Flashing	Memory Card is being accessed.
		Not lit	Memory Card is not being accessed.



DIP Switch



Pin no.	Usage	Setting	Function	Default
SW1	Used to prevent programs from being accidently overwritten from Programming Devices (including the CX-Programmer).	ON	Writing disabled for user program memory.*1	OFF
		OFF	Writing enabled for user program memory.	
SW2	Set to ON to read the program (AUTOEXEC.OBJ file) and parameter area (AUTOEXEC.STD file) from the Memory Card to the CPU Unit when power is turned ON.*2 Used to store the programs in the Memory Card to switch operations, or to automatically transfer programs at startup (Memory Card ROM operation).*3	ON	The user program is automatically transferred from the Memory Card when power is turned ON.	OFF
		OFF	The user program is not automatically transferred from the Memory Card when power is turned ON.	
SW3	Not used.	---	---	OFF
SW4	Not used.	---	---	OFF

Pin no.	Usage	Setting	Function	Default
SW5	Set to ON to automatically detect the baud rate of the CX-Programmer (peripheral bus only) when using the serial port (RS-232C).*4	ON	Serial port (RS-232C) communications condition: Automatically detect CX-Programmer (peripheral bus only) baud rate.	OFF
		OFF	Serial port (RS-232C) communications condition: According to CX-Programmer communications settings in PLC Setup. (Refer to *Table 1*.)	
SW6	Set pin 6 to ON or OFF and use A395.12 in the program to create a user-defined condition without using an Input Unit.	ON	User-defined pin. Turns ON the User DIP Switch Pin Flag (A395.12).	OFF
		OFF	User-defined pin. Turns OFF the User DIP Switch Pin Flag (A395.12).	
SW7	Set the simple backup type. (Refer to Table 2 below.)	---	Specifies the simple backup type.	OFF
SW8	---	Always OFF.	---	OFF

*1 The following data cannot be overwritten when pin 1 is ON:

- All parts of the user program (programs in all tasks)
- All data in the parameter area (such as the PLC Setup and I/O table)
  When pin 1 is ON, the user program and parameter area will not be cleared when the memory clear operation is performed from a Programming Device.

*2 I/O memory files (AUTOEXEC.IOM and ATEXEC□□□.IOM) are automatically transferred when power is turned ON if pin 2 is set to ON. Both the program (AUTOEXEC.OBJ) and parameter area (AUTOEXEC.STD) files must be stored on the Memory Card. It is not necessary for the I/O memory files (AUTOEXEC.IOM and ATEXEC□□□.IOM) to be stored on the Memory Card.

*3 When pin 7 is ON, simple backup reading from the Memory Card is given priority, so even if pin 2 is ON, the user program is not automatically transferred from the Memory Card when power is turned ON.

*4 Connecting to the PLC is not possible from the CX-One Support Software using SYSMAC WAY even if pin 5 on the DIP switch is OFF and the PLC Setup is set to the Host Link protocol (i.e., the default setting).

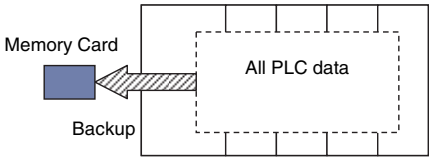
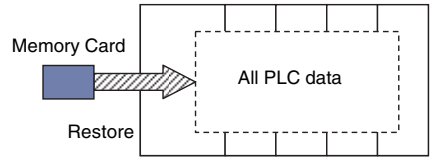
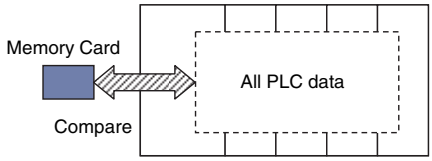
Table 1

Setting / Connection	Pin 5 of DIP switch on front panel	PLC Setup (Serial port (RS-232C))*1
1. Peripheral bus (automatic detection)	ON	---
2. Peripheral bus	OFF (default)	Peripheral bus
3. Host Link*2	OFF (default)	Host Link (default)
4. NT Link	OFF (default)	NT Link
5. No-protocol	OFF (default)	No-protocol
6. Serial Gateway	OFF (default)	Serial Gateway

*1 Set using the CX-Programmer.

*2 Connection is not possible from CX-One Support Software using the SYSMAC WAY protocol.

Table 2

Simple backup type	DIP Switch SW7	Required operation
Backing up all PLC data on the Memory Card: 	ON	Press the Memory Card Power Supply Switch for 3 s.
Restoring all PLC data from the Memory Card: 		Turn ON the power to the PLC.*1
Comparing the Memory Card and the CPU Unit: 	OFF	Press the Memory Card Power Supply Switch for 3 s.

*1 This operation is given priority over automatic transfer at startup (pin 2 set to ON).

Note After reading data from the Memory Card to the CPU Unit using the simple backup operation, the CPU Unit will remain in PROGRAM mode and no operations in any other mode will be possible. To switch to RUN or MONITOR mode, turn OFF the power, turn OFF pin 7, turn the power back ON, and use a Programming Device to change the operating mode.

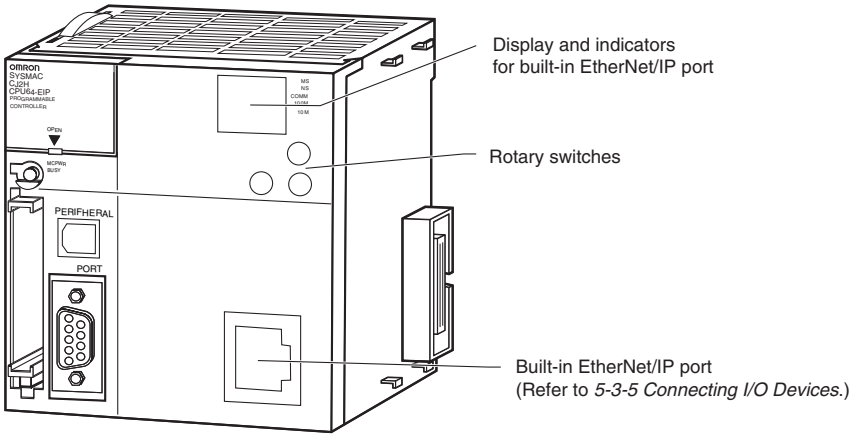
3-1-2 Built-in EtherNet/IP Section

This section describes the components related to the EtherNet/IP port section that is built into the CJ2H-CPU□□-EIP.

Additional Information

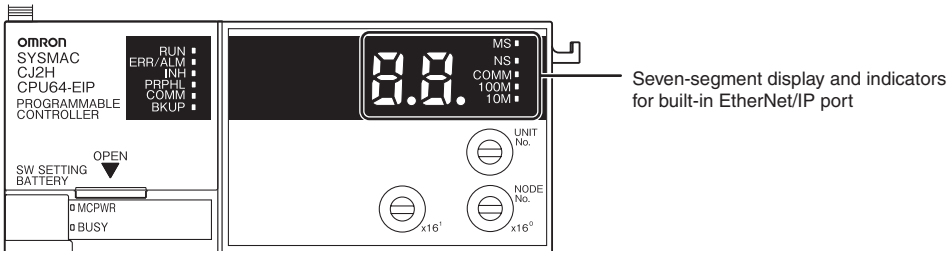
The built-in EtherNet/IP port provides the same performance and functions as a CJ1W-EIP21 EtherNet/IP Unit. Set the unit number and node address with the rotary switches on the front panel of the CPU Unit, and set the communications parameters with the *Edit Parameters* menu command for the Special I/O Unit. For details on the *Edit Parameters*, refer to *8-2 Setting CPU Bus Units and Special I/O Units* in the *CJ2 CPU Unit Software User's Manual* (Cat. No. W473). For details on specifications and settings for the built-in EtherNet/IP port, refer to the *CS/CJ Series EtherNet/IP Units Operation Manual* (Cat. No. W465).

Nomenclature and Functions



Display and Indicators for Built-in EtherNet/IP Port

With a CJ2 CPU Unit, Ethernet node status and Ethernet network status can be monitored by checking the display and indicators at the upper right of the front of the CPU Unit.



- **Status Indicators: MS, NS, COMM, 100M, and 10M**



The MS (Module Status) indicator indicates the status of the built-in EtherNet/IP port itself and the NS (Network Status) indicator indicates the status of the network.

The COMM, 100M, and 10M indicators indicate the status of Ethernet communications.

The MS and NS indicators can be green or red. The COMM, 100M, and 10M indicators are yellow. These indicators can be lit, flashing, or not lit. The following table shows the meaning of these indicator conditions.

Refer to *SECTION 6 Troubleshooting* for details on using these indicators for troubleshooting.

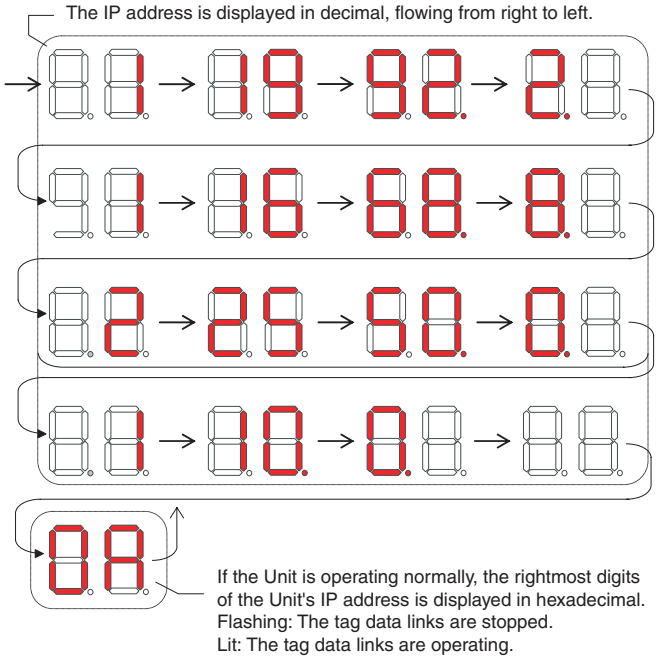
Indicator	Name	Color	Status	Meaning
MS	Module Status	Red	Lit	Fatal error
			Flashing	Recoverable error
		Green	Lit	Normal
		---	Not lit	Power supply OFF
NS	Network Status	Red	Lit	Fatal error
			Flashing	Recoverable error
		Green	Lit	Tag data link and message connections established
			Flashing	Tag data link and message connections not established
		---	Not lit	Offline or power supply OFF
COMM	Communication	Yellow	Lit	Transferring data
			Not lit	Not transferring data
100 M	100 Mbps	Yellow	Lit	100Base-TX link established
			Not lit	100Base-TX link not established
10 M	10 Mbps	Yellow	Lit	10Base-TX link established
			Not lit	10Base-TX link not established

● Seven-segment Display



When the power supply to the PLC is turned ON or the CPU Unit is reset, all of the segments will flash twice, and then the IP address set for the built-in EtherNet/IP port will be displayed on the 7-segment display from right to left. After the entire IP address is displayed, the lower 8 bits of the IP address (node address) will be displayed in hexadecimal.

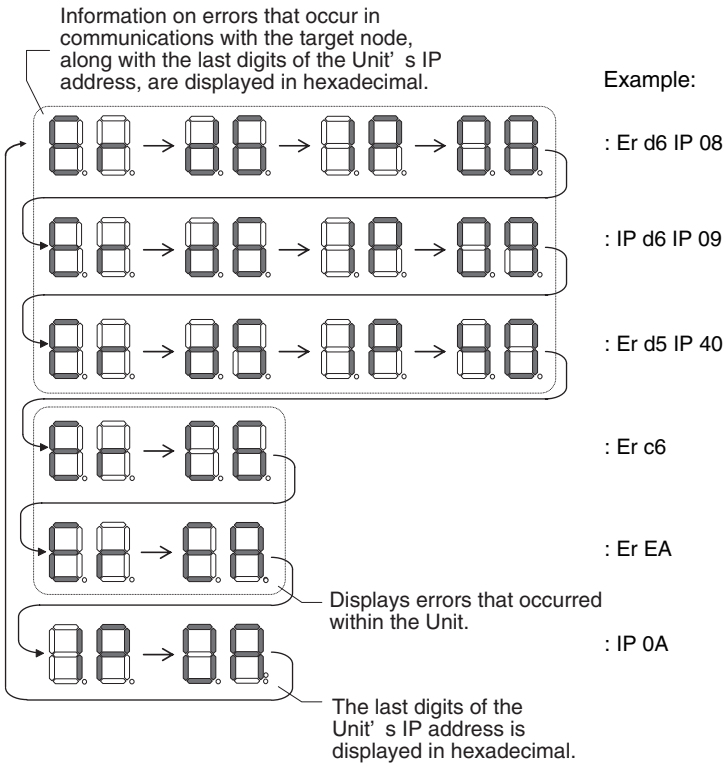
For example, the display will change as follows if the IP address is 192.168.250.10:


The IP address is displayed in decimal, flowing from right to left.
Example:
: 192.
: 168.
: 250.
: 10
: 0A
("0A" is the hexadecimal display for the final row, 10, in the IP address of the local Unit.)
If the Unit is operating normally, the rightmost digits of the Unit's IP address is displayed in hexadecimal.
Flashing: The tag data links are stopped.
Lit: The tag data links are operating.

If an error occurs, the error code will be displayed alternately with the rightmost byte of the affected device's IP address. For details on error codes, refer to *6-2-2 Checking Error Status at the EtherNet/IP Port Seven-segment Display*.

The following examples show the displays for errors.

- A d6 error (failure to connect) has occurred in communications with IP address 192.168.250.8.
- A d6 error (failure to connect) has occurred in communications with IP address 192.168.250.9.
- A d5 error (verification error; target missing) has occurred in communications with IP address 192.168.250.40.
- A C6 error (multiple switches ON) and an EA error (EtherNet/IP expansion setting error) have occurred at the built-in EtherNet/IP port.


Information on errors that occur in communications with the target node, along with the last digits of the Unit's IP address, are displayed in hexadecimal.
Example:
: Er d6 IP 08
: IP d6 IP 09
: Er d5 IP 40
: Er c6
: Er EA
Displays errors that occurred within the Unit.
: IP 0A
The last digits of the Unit's IP address is displayed in hexadecimal.

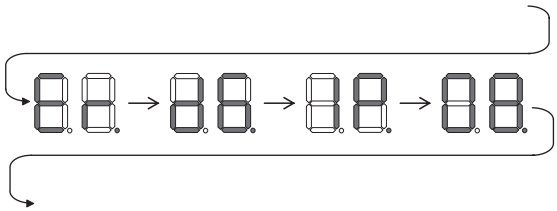
- There is no priority to the order in which the errors are displayed. All of the errors are displayed repeatedly in sequence.

Left/Right Dot LEDs

If an error occurs at multiple devices for which the rightmost 8 bits in the IP addresses are the same, this is indicated by the dots on the right side in display on the target devices.

The following examples show the displays for multiple errors.

- d6 errors (failure to connect) have occurred in communications with IP address 10.0.1.8.
- d6 errors (failure to connect) have occurred in communications with IP address 10.0.2.8.



Rotary Switches

The unit number and node address for the CJ2 CPU Unit built-in EtherNet/IP port are set using the rotary switches. The unit number and node address are allocated in the same way as for a CPU Bus Unit. According to the unit number that is set, words are automatically allocated in the CIO Area and DM Area. For details, refer to the *CJ2 CPU Unit Software User's Manual* (Cat. No. W473).

● Setting the Unit Number

Set a unique unit number for the CJ2 CPU Unit built-in EtherNet/IP port. The same unit number cannot be used by any other CPU Bus Unit connected to the CJ2 CPU Unit.

Use a small screwdriver to make the setting, and be sure not to damage the rotary switch. The unit number is factory-set to 0.



Setting range
0 to F

Precautions for Correct Use

- Always turn OFF the PLC's power supply before setting the unit number.
- When setting the unit number for the first time or when changing the setting, create the PLC's I/O tables.

● Node Address Setting Switches

Set a FINS address for the built-in EtherNet/IP port. With the FINS communications service, multiple EtherNet/IP Units (including the CJ2 Unit built-in EtherNet/IP port) connected by Ethernet are identified by their node addresses. Using the node address switches, set a unique node address in hexadecimal. The same node address cannot be used by any other EtherNet/IP Unit or Ethernet Unit connected on the same Ethernet network.

As long as it does not duplicate any other address, the node address can be set from 01 to FE (1 to 254 in decimal).

Setting range
01 to FE hex (1 to 254 decimal)



Note The node address is factory-set to 01. With the default setting, the values set on these switches become the last two digits of the built-in EtherNet/IP port's IP address.

The default IP address is 192.168.250.*node_address.* With the factory-set node address of 01, the default IP address is 192.168.250.1.

The node address can be set to any number in the setting range (01 to FE), as long as the same address is not set on another node in the network.

Precautions for Correct Use

- Always turn OFF the PLC's power supply before setting the unit number.
- When setting the unit number for the first time or when changing the setting, create the PLC's I/O tables.

Additional Information

- If the node address setting is changed during operation, the MS Indicator will flash red.

● Relationship with IP Address

When using the automatic generation method (dynamic/static) for IP address conversion, the rightmost byte of the IP address that is set for the built-in EtherNet/IP port must be set to the same value as the node address. If it cannot be set to the same value as the node address, then the address conversion method must be set to the IP address table method or the IP address + automatic generation method. For details, refer to the *CS/CJ Series EtherNet/IP Units Operation Manual* (Cat. No. W465).

3-2 Memory Card

3-2-1 Models and Specifications

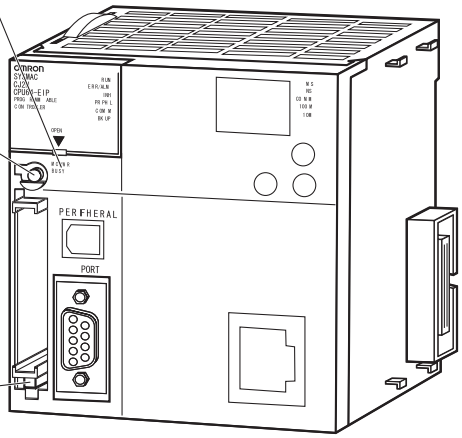
Model number		HMC-EF583	HMC-EF283	HMC-EF183
Memory Card capacity		512 Mbytes	256 Mbytes	128 Mbytes
Common specifications	Dimensions	42.8 × 36.4 × 3.3 mm (W × H × T)		
	Weight	15 g max.		
	Current consumption	Approx. 30 mA (when used with PLC)		
	Environmental specifications	Same a general specifications of PLC		
	No. of writes	100,000 (guaranteed value)		
Factory specifications	No. of files writable to root directory	511		
	File system	FAT16		

3-2-2 Operating Procedures

Memory Card Indicators
MCPOWER (green): Lit when power is being provided to the Memory Card.
BUSY (orange): Lit when the Memory Card is being accessed.

Simple Backup/Memory Card Power Supply Switch
This switch has the following two functions.
- Simple Backup
  To back up all CPU Unit data to the Memory Card, press this switch for 3 s when DIP switch pin 7 is set to ON.
- Turning OFF Power to the Memory Card
  Press this switch to turn OFF the power before removing the Memory Card.

Memory Card Eject Button



Additional Information

Simple Backup
The simple backup function copies all CPU Unit data (user program, parameters, and I/O memory) to a Memory Card, without having to use a Programming Device.

For details, refer to *8-3 Simple Backup*.

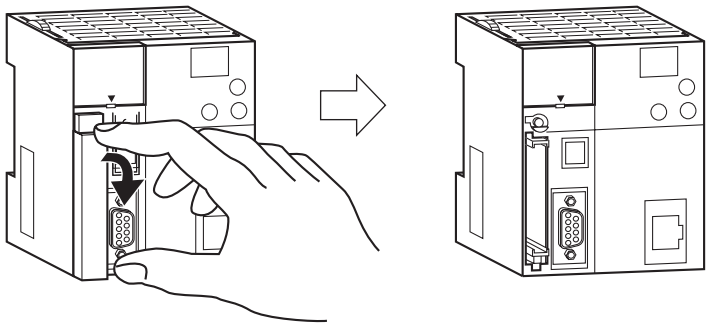
3-2-3 Installing and Removing

Before Using a Memory Card

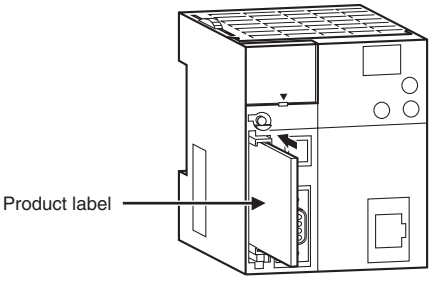
- Observe the following precautions while the Memory Card is being accessed. The Memory Card may become unusable if these precautions are not followed.
  - Never turn OFF the PLC while the CPU is accessing the Memory Card.
  - Never remove the Memory Card while the CPU is accessing the Memory Card. Press the Memory Card power supply switch and wait for the BUSY indicator to go OFF before removing the Memory Card.
- Never insert the Memory Card facing the wrong way. If the Memory Card is inserted forcibly, it may become unusable.
- To delete all the data on the Memory Card by formatting the Memory Card, insert the Memory Card in the CPU Unit and perform the operation from the CX-Programmer.

Installing the Memory Card

1. Pull the top end of the Memory Card cover forward and remove from the Unit.

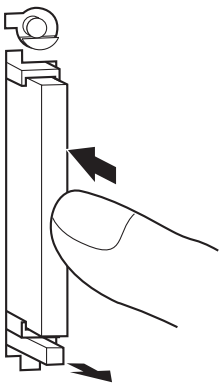


2. Insert the Memory Card with the label facing to the left. (Insert with the Δ on the Memory Card label and the Δ on the CPU Unit facing each other.)



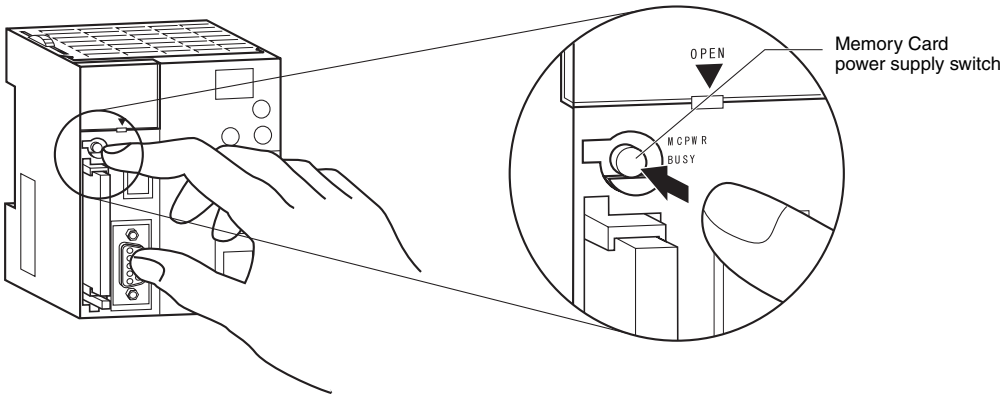
3. Push the Memory Card securely into the compartment.

If the Memory Card is inserted correctly, the Memory Card eject button will be pushed out.



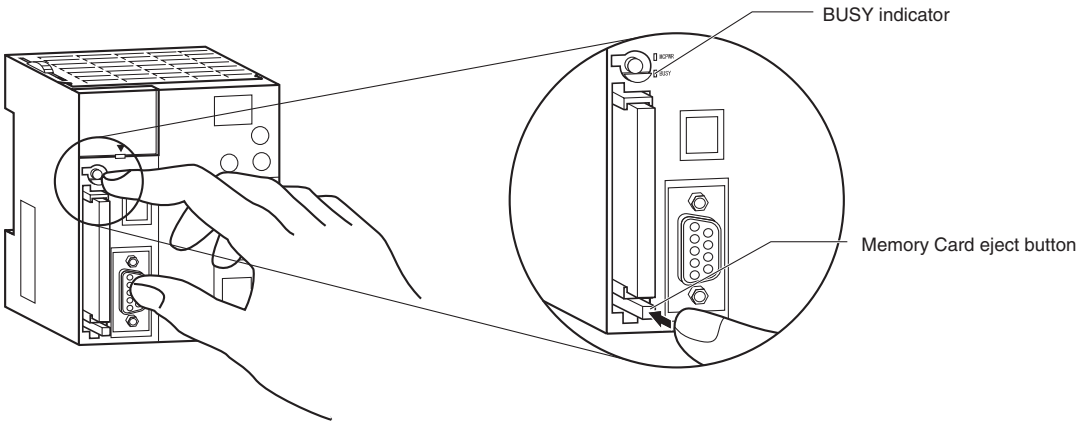
Removing the Memory Card

1. Press the Memory Card power supply switch.



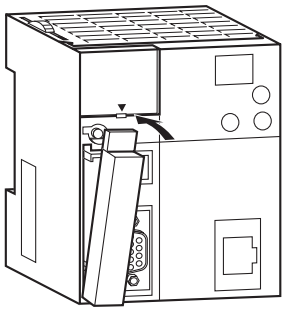
2. Press the Memory Card eject button after the BUSY indicator is no longer lit.

The Memory Card will be ejected from the compartment.

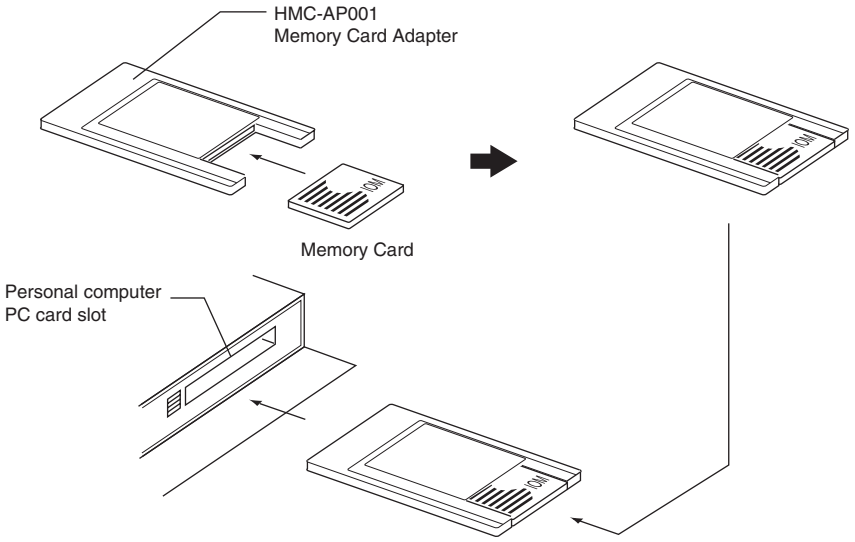


3. Pull out the Memory Card.

4. Install the Memory Card cover when a Memory Card is not being used.



Installing the Memory Card into a Personal Computer



3-3 Power Supply Units

3-3-1 Models and Specifications

Item	Specifications				
Power Supply Unit	CJ1W-PA205R	CJ1W-PA205C	CJ1W-PA202	CJ1W-PD025	CJ1W-PD022
Supply voltage	100 to 240 VAC (wide-range), 50/60 Hz			24 VDC	
Operating voltage and frequency ranges	85 to 264 VAC, 47 to 63 Hz			19.2 to 28.8 VDC	21.6 to 26.4 VDC
Power consumption	100 VA max.		50 VA max.	50 W max.	35 W max.
Inrush current (See note 1.)	At 100 to 120 VAC: 15 A/8 ms max. for cold start at room temperature At 200 to 240 VAC: 30 A/8 ms max. for cold start at room temperature		At 100 to 120 VAC: 20 A/8 ms max. for cold start at room temperature At 200 to 240 VAC: 40 A/8 ms max. for cold start at room temperature	At 24 VDC: 30 A/20 ms max. for cold start at room temperature	
Output capacity (See note 7.)	5.0 A, 5 VDC (including supply to CPU Unit)		2.8 A, 5 VDC (including supply to CPU Unit)	5.0 A, 5 VDC (including supply to CPU Unit)	2.0 A, 5 VDC (including supply to CPU Unit)
	0.8 A, 24 VDC		0.4 A, 24 VDC	0.8 A, 24 VDC	0.4 A, 24 VDC
	Total: 25 W max.		Total: 14 W max.	Total: 25 W max.	Total: 19.6 W max.
Output terminal (service supply)	Not provided				
RUN output (See note 2.)	Contact configuration: SPST-NO Switch capacity: 250 VAC, 2 A (resistive load) 120 VAC, 0.5 A (inductive load), 24 VDC, 2A (resistive load) 24 VDC, 2 A (inductive load)	Not provided.	Not provided.	Not provided.	Not provided.
Replacement notification function	Not provided.	With Alarm output (open collector output) 30 VDC max., 50 mA max.	Not provided.	Not provided.	Not provided.

Item	Specifications				
Insulation resistance	20 MΩ min. (at 500 VDC) between AC external and GR terminals*3	• 20 MΩ min. (at 500 VDC) between all external terminals and GR terminal, and between all alarm output terminals. • 20 MΩ min. (at 250 VDC) between all alarm output terminals and GR terminal.	20 MΩ min. (at 500 VDC) between AC external and GR terminals*3	20 MΩ min. (at 500 VDC) between DC external and GR terminals*3	---*6
Dielectric strength*4	2,300 VAC 50/60 Hz for 1 min between AC external and GR terminals*3 Leakage current: 10 mA max.	• 2,300 VAC, 50/60 Hz for 1 minute between all external terminals and GR terminal and between all alarm output terminals with a leakage current of 10 mA max. • 1,000 VAC, 50/60 Hz for 1 minute between all alarm output terminals and GR terminal with a leakage current of 10 mA max.	2,300 VAC 50/60 Hz for 1 min between AC external and GR terminals*3 Leakage current: 10 mA max.	1,000 VAC 50/60 Hz for 1 min between DC external and GR terminals*3 Leakage current: 10 mA max.	---*6
	1,000 VAC 50/60 Hz for 1 min between DC external and GR terminals*3 Leakage current: 10 mA max.				
Noise immunity	2 kV on power supply line (Conforms to IEC61000-4-4.)				
Vibration resistance	5 to 8.4 Hz, 3.5-mm amplitude, 8.4 to 150 Hz, acceleration: 9.8 m/s^2 in X, Y, and Z directions for 100 minutes (Time coefficient: 10 minutes × coefficient factor 10 = total time 100 min.) (according to JIS C60068-2-6)				
Shock resistance	147 m/s^2 3 times each in X, Y, and Z directions (Relay Output Unit: 100 m/s^2) (according to JIS C60068-2-27)				
Ambient operating temperature	0 to 55°C				
Ambient operating humidity	10% to 90% (with no condensation)	10% to 90% (with no condensation)*5	10% to 90% (with no condensation)		
Atmosphere	Must be free from corrosive gases.				
Ambient storage temperature	–20 to 75°C (excluding battery)	–20 to 75°C*5	–20 to 75°C (excluding battery)		

*1 The AC and DC values above are given for a cold start, and the AC values are at room temperature. The AC inrush control circuit uses a thermistor element with a low-temperature current control characteristic. If the ambient temperature is high or the PLC is hot-started, the thermistor will not be sufficiently cool, and the inrush current given in the table may be exceeded by up to twice the given value. When selecting fuses or breakers for external circuits, allow sufficient margin in shut-off performance. The DC inrush control circuit uses a capacitor-charging delay circuit. If the power is OFF for only a short time for a hot-start, the capacitor will not sufficiently charge and the inrush current given in the table may be exceeded by up to twice the given value.

*2 Supported only when mounted to CPU Rack.

*3 Disconnect the Power Supply Unit's LG terminal from the GR terminal when testing insulation and dielectric strength. Testing the insulation and dielectric strength with the LG terminal and the GR terminals connected will damage internal circuits in the CPU Unit.

*4 Change the applied voltage gradually using the adjuster on the Tester. If the full dielectric strength voltage is applied or turned OFF using the switch on the Tester, the generated impulse voltage may damage the Power Supply Unit.

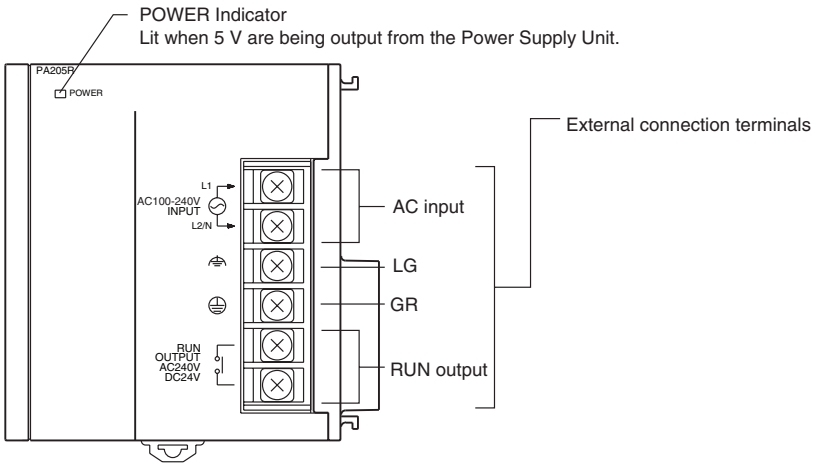
*5 Maintain an ambient storage temperature of -25 to 30°C and relative humidity of 25% to 70% when storing the Unit for longer than 3 months to keep the replacement notification function in optimum working condition.

*6 CJ1W-PD022 is not insulated between the primary DC power and secondary DC power.

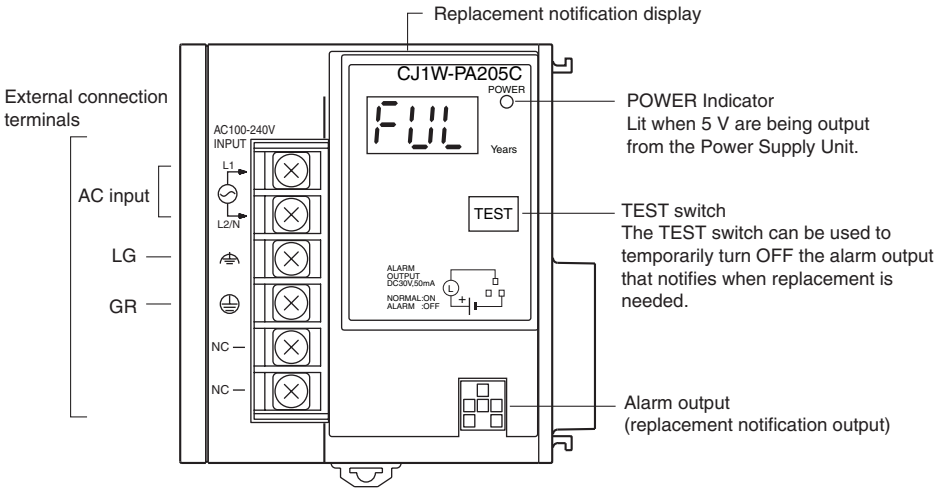
*7 Internal components in the Power Supply Unit will deteriorate or be damaged if the Power Supply Unit is used for an extended period of time exceeding the power supply output capacity or if the outputs are shorted.

3-3-2 Components

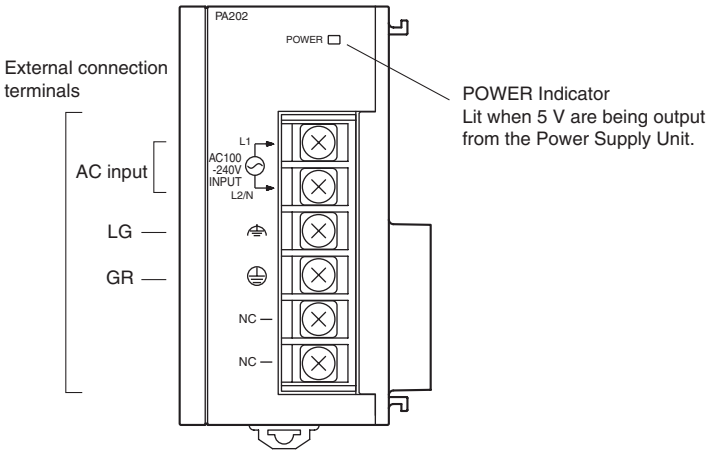
● Example: CJ1W-PA205R



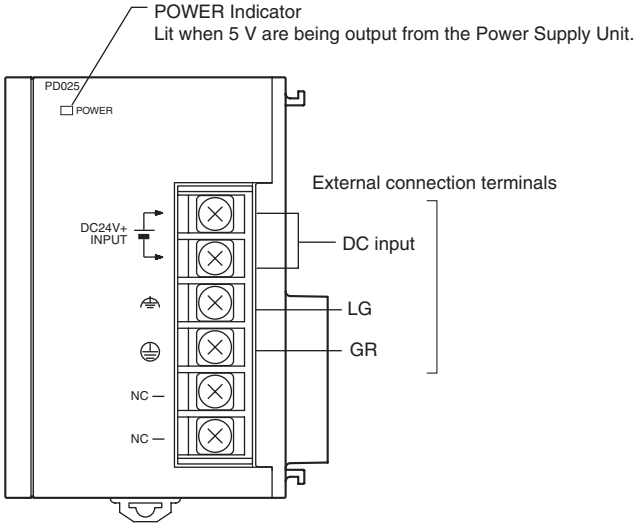
● Example: CJ1W-PA205C



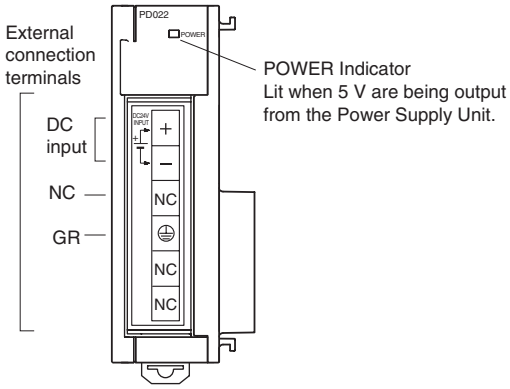
● Example: CJ1W-PA202



● **Example: CJ1W-PD025**



● **Example: CJ1W-PD022**



AC Input

Supply 100 to 240 VAC (allowable: 85 to 264 VAC).

Note The CJ1W-PA205R, CJ1W-PA205C, and CJ1W-PA202 have a wide input range, so they do not have voltage switching terminals.

DC Input

Supply 24 VDC.

Model	Allowable power supply voltage fluctuation range
CJ1W-PD025	19.2 to 28.8 VDC (±20%)
CJ1W-PD022	21.6 to 26.4 VDC (±10%)

LG

Ground to a resistance of 100 Ω or less to increase noise resistance and avoid electric shock.

GR

Ground to a resistance of 100 Ω or less to avoid electric shock.

RUN Output (CJ1W-PA205R Only)

The internal contact turns ON when the CJ2 CPU Unit is operating (RUN or MONITOR mode). The Power Supply Unit must be in the CPU Rack to use this output.

Alarm Output (CJ1W-PA205C Only)

The alarm output is used to notify when Power Supply Unit replacement is required. The output is normally ON. The output turns OFF when the time until replacement is 6 months or less.

3-3-3 Selecting a Power Supply Unit

After determining what power supply voltage is required, whether power output terminals and a RUN output are required, and whether replacement notification is required, calculate the current and power requirements for each Rack.

Condition 1: Current Requirements

There are two voltage groups for internal power consumption: 5 VDC and 24 VDC.

For details on the current consumption of individual Units, refer to *2-1-4 Configuration Units*.

● Current Consumption at 5 VDC

The following table shows the current that can be supplied to Units (including the CJ2 CPU Unit) that use 5-VDC power.

Model	Maximum current at 5 VDC
CJ1W-PA205R/205C	5.0 A
CJ1W-PA202	2.8 A
CJ1W-PD025	5.0 A
CJ1W-PD022	2.0 A

● Current Consumption at 24 VDC

The following table shows the current that can be supplied to Units that use 24-VDC power supply.

Model	Maximum current at 24 VDC
CJ1W-PA205R/205C	0.8 A
CJ1W-PA202	0.4 A
CJ1W-PD025	0.8 A
CJ1W-PD022	0.4 A

Condition 2: Power Requirements

The following table shows the maximum total power that can be supplied at 5 VDC and 24 VDC.

Model	Maximum total power output
CJ1W-PA205R/205C	25 W
CJ1W-PA202	14 W
CJ1W-PD025	25 W
CJ1W-PD022	19.6 W

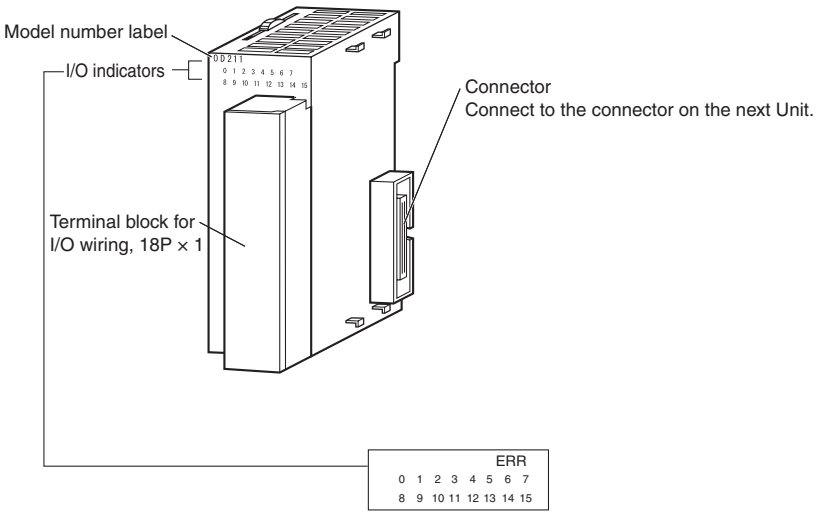
For details on the current consumption of individual Units, refer to *2-1-2 CPU Rack*, *2-1-3 Expansion Racks*, and *2-1-4 Configuration Units*. Refer to *2-1-5 Calculating Unit Current Consumption* for an example of calculating the current consumption.

3-4 CJ-series Basic I/O Units

3-4-1 Basic I/O Units with Terminal Blocks

Part Names and Functions

● Eight/sixteen-point Units (18-point Terminal Blocks)

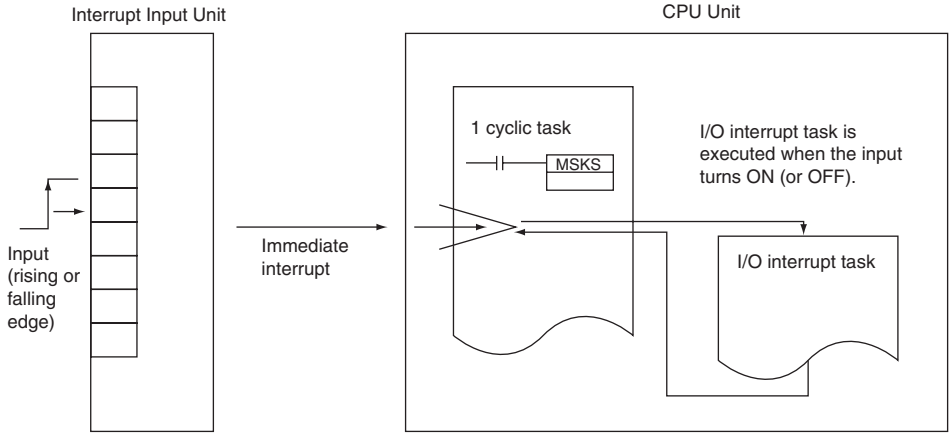

Model number label
I/O indicators
OD211
0 1 2 3 4 5 6 7
8 9 10 11 12 13 14 15
Connector
Connect to the connector on the next Unit.
Terminal block for
I/O wiring, 18P × 1
ERR
0 1 2 3 4 5 6 7
8 9 10 11 12 13 14 15

Note The CJ1W-OD202, CJ1W-OD204, and CJ1W-OD212 also have an ERR indicator for the load short-circuit alarm.

Interrupt Input Units

● Functions

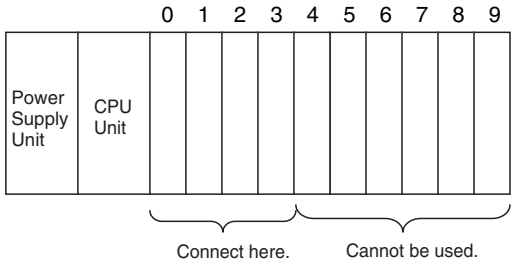
Interrupt Input Units are used to execute interrupt programs on the rising or falling edge of an input signal. When the specified interrupt input turns ON (or OFF), execution of the cyclic program in the CPU Unit is interrupted and an I/O interrupt task (task number 100 to 131) is executed. When execution of the I/O interrupt task has been completed, the cyclic program is again executed starting from the instruction after which it was interrupted.



● Application Precautions

- Interrupt Input Units must be mounted in the locations described below.

  When using a CJ2H-CPU□□-EIP CPU Unit, all Interrupt Input Units must be connected in any of the four positions immediately to the right of the CPU Unit. If connected in any other position in the CPU Rack or anywhere in an Expansion Rack, and I/O setting error (fatal) will occur.



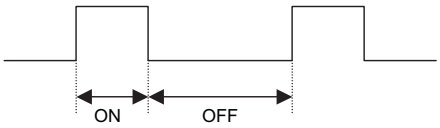
- The Interrupt Input Units must be connected to slot numbers 0 to 3 even when the I/O tables are edited using the CX-Programmer. If the Interrupt Input Units are not connected in the correct positions, an error will occur when the I/O tables are generated from the CX-Programmer. A401.10 will turn ON to indicate an I/O setting error and A405.08 will turn ON to indicate that an Interrupt Input Unit is in the wrong position.

Note Even if a Unit is physically in one of the correct positions, a Dummy Unit can be registered in the I/O tables, causing a Unit to be defined in a position different from its physical position.

- There are limits to the number of Interrupt Input Units that can be mounted. If these limits are exceeded, a too many I/O points error (fatal error) will occur.
- The input response time cannot be changed for the CJ1W-INT01, and the related portions of the Basic I/O Unit input time constants in the PLC Setup, and the setting status in A200 to A259 will not be valid.

● Input Signal Width

Input signals must meet the following conditions.



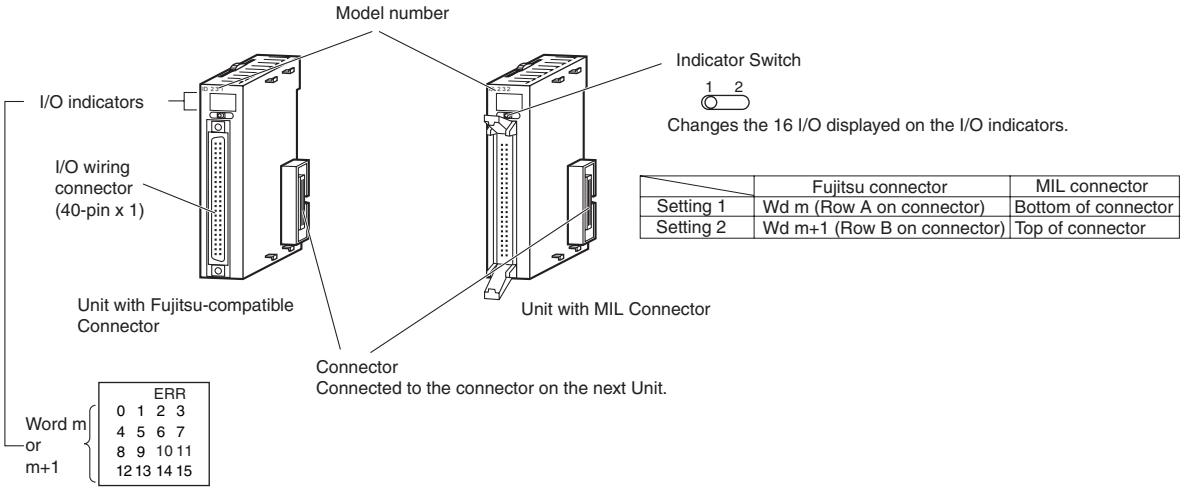
Unit	ON time	OFF time
CJ1W-INT01	0.05 ms min.	0.5 ms min.

3-4-2 Thirty-two/Sixty-four-point Basic I/O Units with Connectors

Units are available with either Fujitsu-compatible connectors (CJ1W-□D□□1) or MIL connectors (CJ1W-□D□□2/3).

Part Names

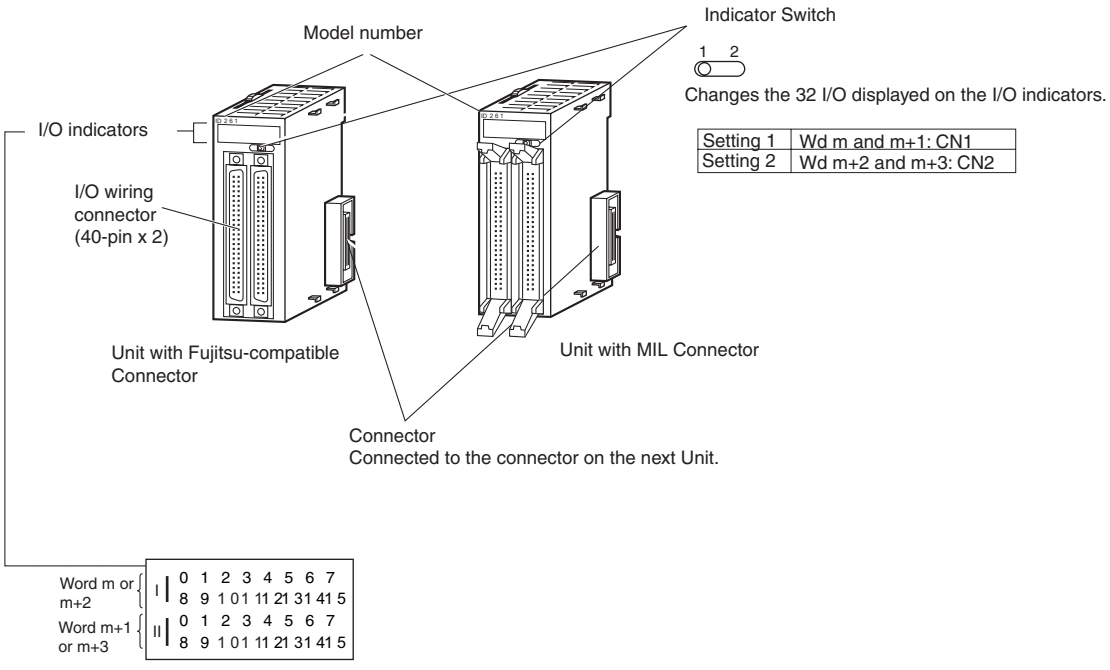
- **Thirty-two-point Units (Models with 40-point Fujitsu Connector or MIL Connector)**



	Fujitsu connector	MIL connector
Setting 1	Wd m (Row A on connector)	Bottom of connector
Setting 2	Wd m+1 (Row B on connector)	Top of connector

Note: Only the CJ1W-OD232 has an ERR indicator for the load short-circuit alarm.

- **Sixty-four-point Units (Models with Two 40-point Fujitsu Connectors or MIL Connector)**


Indicator Switch
Model number
1 2
Changes the 32 I/O displayed on the I/O indicators.
I/O indicators
I/O wiring connector (40-pin x 2)
Unit with Fujitsu-compatible Connector
Unit with MIL Connector
Connector
Connected to the connector on the next Unit.
Word m or m+2
Word m+1 or m+3
I
II
0 1 2 3 4 5 6 7
8 9 10 11 21 31 41 5

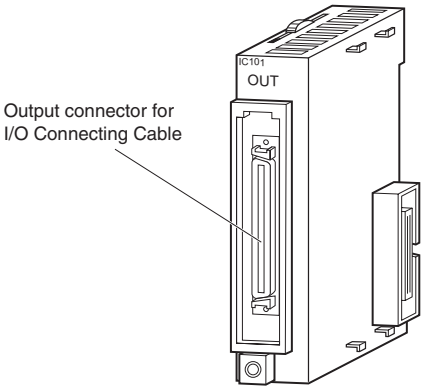
Setting 1	Wd m and m+1: CN1
Setting 2	Wd m+2 and m+3: CN2

3-5 I/O Control Units and I/O Interface Units

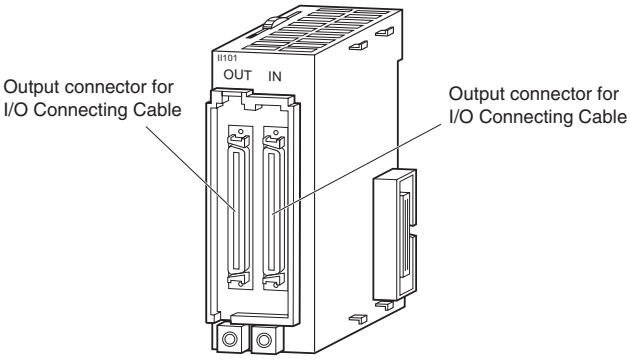
An I/O Control Unit and I/O Interface Units are used to connect Expansion Racks to expand the system.

3-5-1 Component Names

CJ1W-IC101
I/O Control Unit



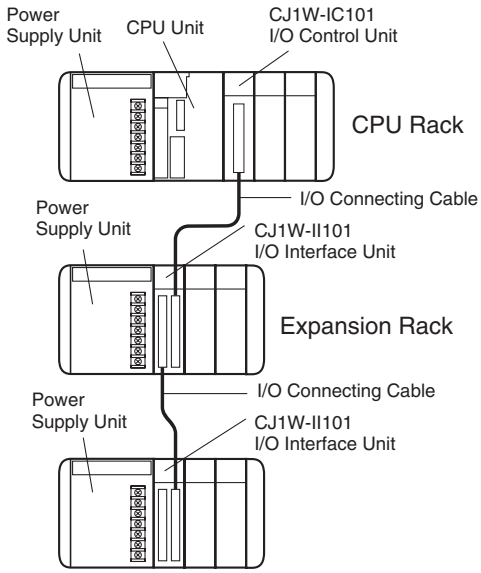
CJ1W-II101
I/O Interface Unit



Precautions for Correct Use

Attached the enclosed cover to the I/O Connecting Cable connector on the I/O Interface Unit when it is not being used to protect it from dust.

3-5-2 System Configuration



The I/O Control Unit is connected directly to the CJ2 CPU Unit. If it is not immediately to the right of the CPU Unit, correct operation may not be possible.

The I/O Interface Unit is connected directly to the Power Supply Unit. If it is not immediately to the right of the Power Supply Unit, correct operation may not be possible.

4

Support Software

This section describes the software that is used to program and debug a CJ2 PLC. It also describes how to connect the Programming Device and the PLC.

4-1 Support Software 4-2
4-1-1 CX-One FA Integrated Tool Package 4-2
4-2 Connection Methods 4-6
4-2-1 Connecting by USB 4-6
4-2-2 Connecting by RS-232C 4-8
4-2-3 Connecting by Ethernet 4-10

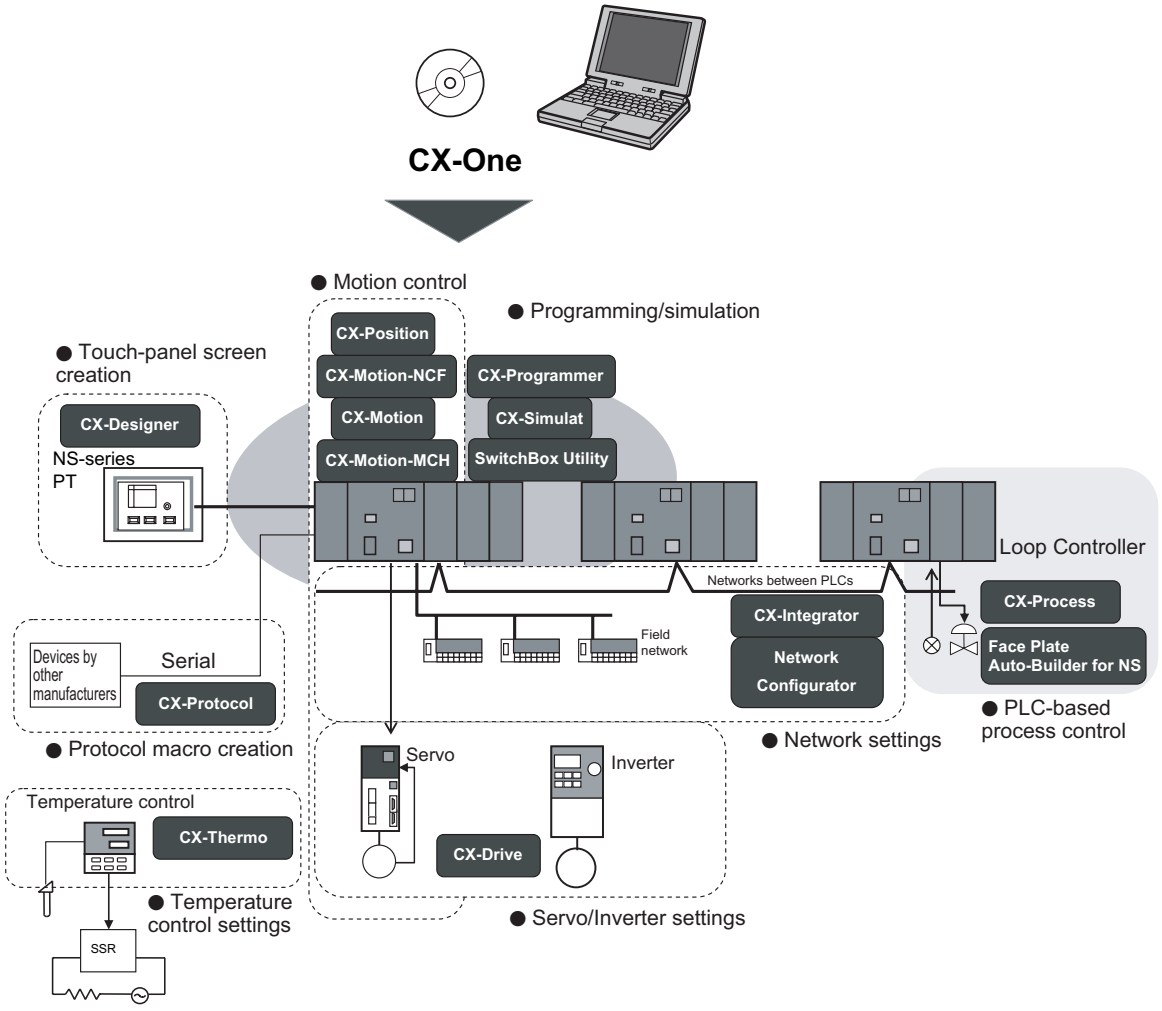
4-1 Support Software

"Support Software" refers to software applications for programming and debugging OMRON Programmable Controllers.

4-1-1 CX-One FA Integrated Tool Package

The CX-One provides an integrated package of Support Software for OMRON PLCs and components. It consists of software applications for PLC programming, network settings, touch-panel screen creation, servo control, inverters, temperature control, and other functions.

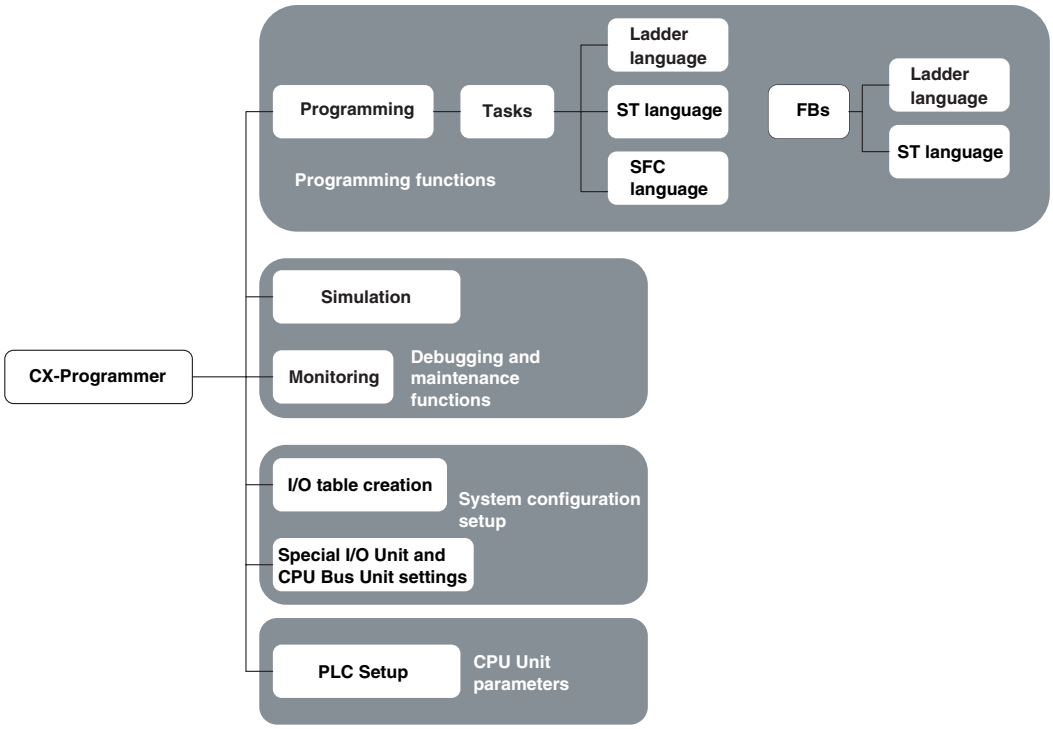
CX-One Integrated Tool Package Contents



Application	CX-One Software	Description
Programming	**CX-Programmer**	Basic software for creating and debugging PLC programs.
	SwitchBox Utility	Utility software to support PLC debugging operations.
Network settings	**CX-Integrator**	Software for starting and setting FA networks, such as Controller Link, DeviceNet, CompoWay/F, Ethernet, and CompoNet. Includes routing table components, data link components, and DeviceNet Configurator functions.
	Network Configurator	Software for setting tag data links for the built-in EtherNet/IP port.
	CX-FLnet	Software for making FL-net Unit system settings and performing monitoring.
Touch-panel screen creation	**CX-Designer**	Software for creating screen data for touch panel NS-series PTs.
Protocol macro creation	**CX-Protocol**	Software for creating protocols (protocol macros) for exchanging data with general-purpose external devices connected to Serial Communications Boards/Units and Option Boards.
Simulation	**CX-Simulator**	Software for simulating PLC operations on a personal computer and debugging programs without requiring a CPU Unit.
Motion Control	**CX-Position**	Software for creating and monitoring data for Position Control Units.
	CX-Motion-NCF	Software for creating and monitoring data for Position Control Units (MECHATROLINK communications models).
	CX-Motion-MCH	Software for creating data for Motion Control Units (MECHATROLINK communications models), and for creating and monitoring motion programs.
	CX-Motion	Software for creating data for Motion Control Units, and for creating and monitoring motion programs.
Servo/Inverter settings	**CX-Drive**	Software for setting and adjusting Inverter and servo data.
PLC-based process control	**CX-Process Tool**	Software for creating and debugging function blocks for Loop Controllers (Loop Control Units/Boards, Process CPU Units, and Loop CPU Units).
	Face Plate Auto-Builder for NS	Software for automatic generation of screen data (project files) for touch panel NS-series PTs from Loop Controller function block tag information.
Temperature control settings	**CX-Thermo**	Software for setting and adjusting Temperature Controller parameters.

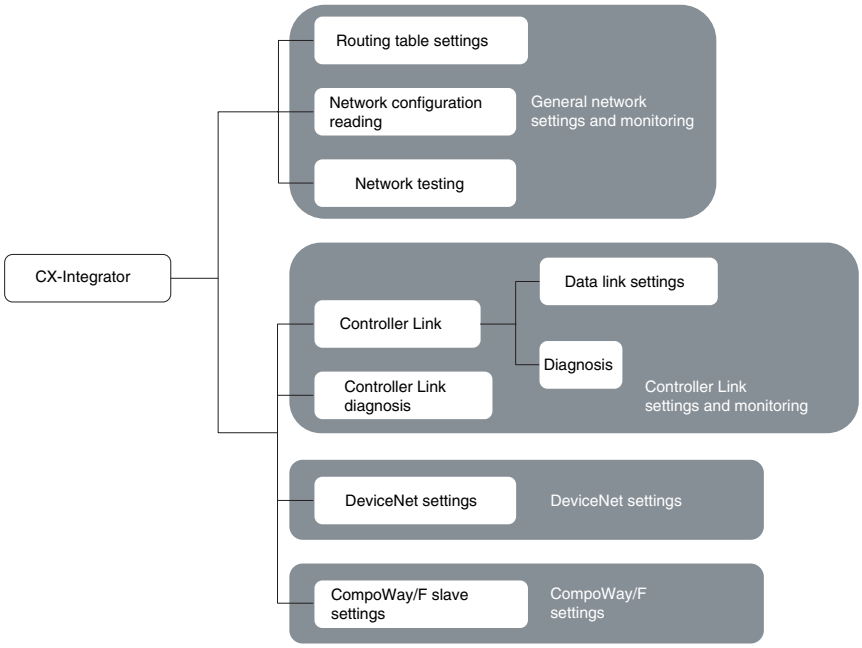
CX-Programmer

The CX-Programmer is a basic software application for creating and debugging PLC programs.



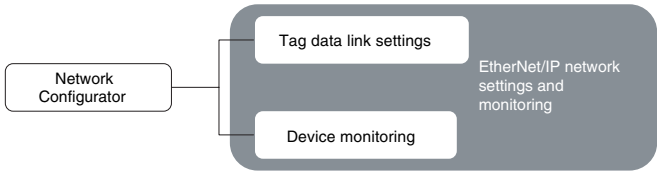
CX-Integrator

The CX-Integrator is a software application for setting up FA networks, such as Controller Link, DeviceNet, CompoWay/F, Ethernet, and CompoNet.



Network Configurator

The Network Configurator is software for setting tag data links using the built-in EtherNet/IP port.



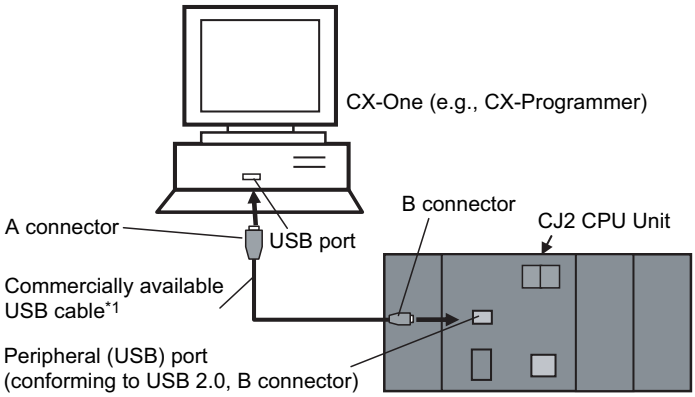
4-2 Connection Methods

The CJ2 CPU Unit can be connected by USB cable, Ethernet twisted-pair cable, or RS-232C cable to a personal computer with CX-One Support Software (e.g., CX-Programmer) installed.

4-2-1 Connecting by USB

Connection Method

Using commercially available USB cable, connect CX-One Support Software via a standard peripheral (USB) port at the personal computer.



*1 Commercially available USB cable: 5 m max., for USB 1.1 or 2.0.

Connecting Cable

Use the following cable to connect the CJ2 CPU Unit to the computer running the Support Software.

Port at Unit	Port at computer	Network type (communications mode)	Model	Length	Remarks
Peripheral (USB) port (Conforms to USB 2.0, B connector)	USB port	12 Mbps, USB 2.0	Commercially available USB cable (A connector - B connector)	5 m	---

Before Connecting

In order to connect the PLC to a personal computer by USB, a USB driver must be installed in the personal computer. The USB driver for USB connections is automatically stored in the following directory in the personal computer when CX-One is installed:

C:\Program Files\OMRON\CX-Server\USB\Win2000_XP\inf

When the personal computer is connected to the PLC by USB cable, the personal computer automatically recognizes the device and the USB driver installation is started. For details on how to install the USB driver, refer to *A-5 Installing the USB Driver*.

CX-Programmer Settings

The method for connecting the PLC to the personal computer is set using the CX-Programmer. For details on using the CX-Programmer to set the connection method, refer to the *CJ2 CPU Unit Software User's Manual* (Cat. No. W473).

Restrictions on Connecting by USB

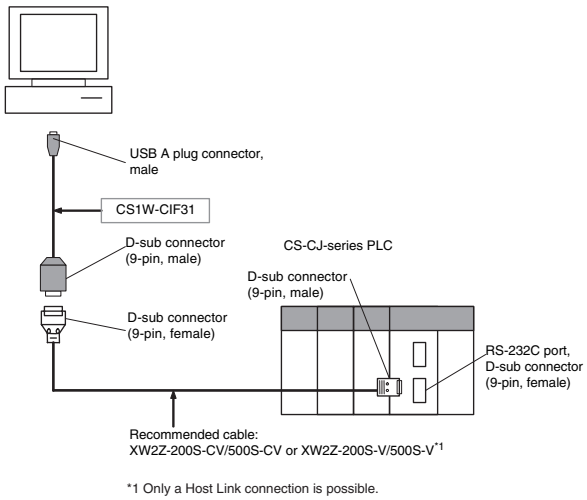
Based on USB specifications, the following restrictions apply when connecting a personal computer and components.

- Only one CJ2 CPU Unit can be connected by USB to a single personal computer. It is not possible to connect multiple CJ2 CPU Units simultaneously.
- Do not remove the USB cable while connected online. The application must be offline before the cable is removed. If the cable is removed while connected online, one of the following situations will occur depending on the operating system.
  - Windows 2000/XP
    The Support Software online status will not be restored by simply re-inserting the USB cable. Once the Support Software has gone offline, the cable must be re-inserted and the Support Software online connection operation must be repeated.
  - Windows 98/Me
    If the USB cable is removed while connected online, a blue error screen may be displayed. If that occurs, the personal computer must be restarted.

Additional Information

The USB port on a computer can be connected to the PLC serial port (RS-232C) by using CJ1W-CIF31 USB-Serial Conversion Cable. (The USB driver for the CJ1W-CIF31 must be installed.)

Refer to *A-5 Installing the USB Driver* for the installation procedure for the USB driver.



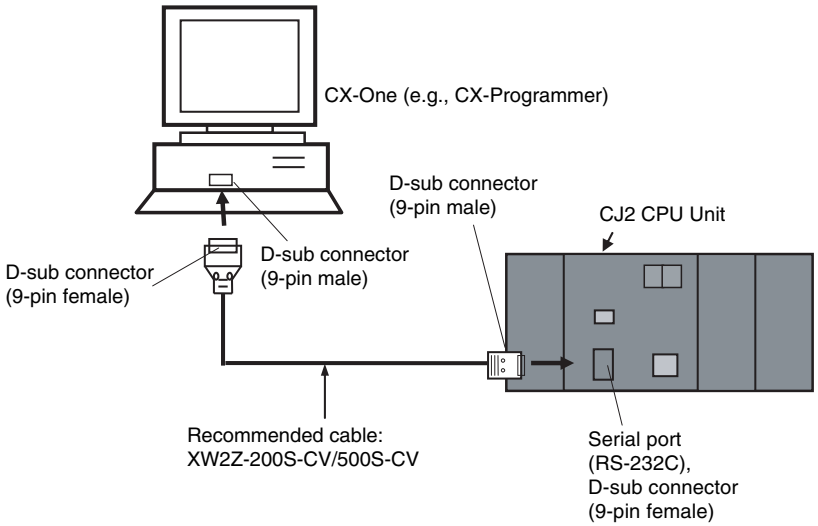
*1 Only a Host Link connection is possible.

4-2-2 Connecting by RS-232C

Connection Method

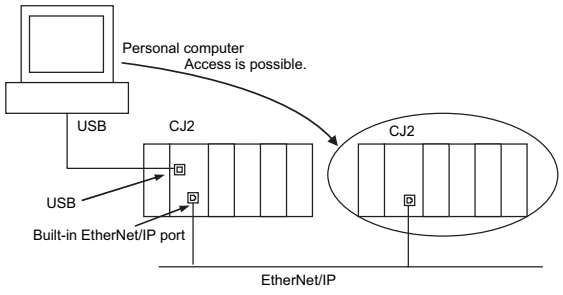
Using commercially available RS-232C cable, connect the CX-One Support Software (e.g., CX-Programmer) via a standard serial port at the personal computer.

The network type must be set to the Toolbus. A Host Link connection cannot be used.



Additional Information

Connecting to the PLC by EtherNet/IP via USB or RS-232C
The Support Software can be directly connected by USB or RS-232C to one CJ2 CPU Unit and access other CPU Units on the EtherNet/IP network via the built-in EtherNet/IP ports on the CJ2 CPU Units. For details, refer to the *CJ2 CPU Unit Software User's Manual* (Cat. No. W473).



Connecting Cable

Use the following cable to connect the CJ2 CPU Unit to the computer running the Support Software.

Port at Unit	Port at computer	Network type (communications mode)	Model	Length	Remarks
Serial port (RS-232C) (D-sub, 9-pin, female)	D-sub, 9-pin, male	Serial communications (Toolbus only*1)	XW2Z-200S-CV	2 m	Use a static-resistant connector.
			XW2Z-500S-CV	5 m	

*1 Connection is not possible from CX-One Support Software using the SYSMAC WAY (Host Link) protocol.

Precautions for Safe Use

- When the above cable connector is connected to the PLC serial port (RS-232C), be sure to discharge static electricity by touching grounded metal before touching the cable connector. The XW2Z-□□□S-CV Cable is particularly resistant to static electricity because it uses a static-resistant connector hood (XM2S-0911-E). Even when this Cable is used, however, be sure to discharge static electricity before touching the connector.
- Use the specialized cable described above for connecting cable. Using ordinary commercially available RS-232C cable for personal computers may result in damage to external devices and the CPU Unit.

Additional Information

It is possible to create RS-232C cable for connecting to the serial port (RS-232C). The connectors shown in the following table are included with the CJ2 CPU Unit as standard equipment for creating cables. For details on creating cables, refer to *A-4 Connecting to the RS-232C Serial Port on the CPU Unit*.

Name	Model	Specifications	
Plug	XM2A-0901	9-pin, male	Use in combination. (One of each is provided as standard equipment with the CPU Unit.)
Hood	XM2S-0911-E	9-pin static-resistant connector with millimeter screws	

Setting the Communications Protocol

Select the protocol for communications between the PLC and the CX-Programmer. For a SYSMAC WAY (Host Link) connection, turn OFF pin 5 of the DIP switch on the front panel. For a peripheral bus connection (faster than SYSMAC WAY), turn ON pin 5.

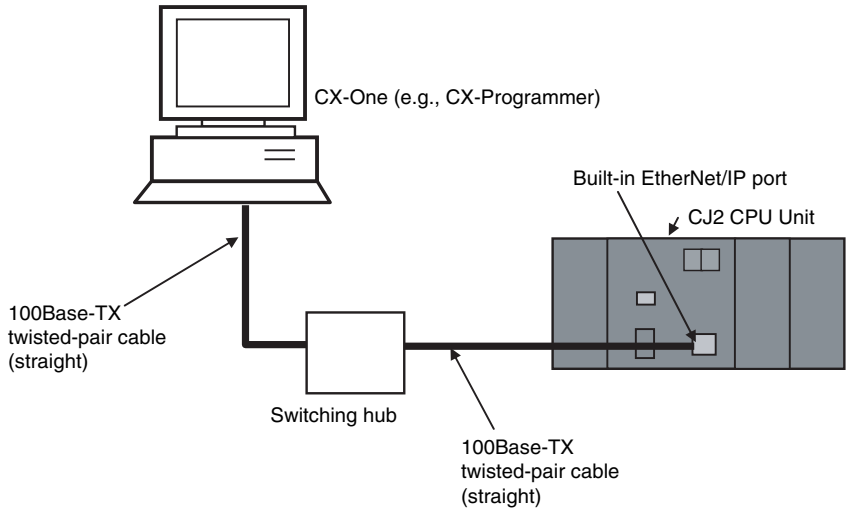
CX-Programmer Settings

The method for connecting the PLC to the personal computer is set using the CX-Programmer. For details on using the CX-Programmer to set the connection method, refer to the *CJ2 CPU Unit Software User's Manual* (Cat. No. W473).

4-2-3 Connecting by Ethernet

Connection Method

Use commercially available Ethernet 100Base-TX STP twisted-pair cable (straight) to connect the CX-One Support Software (e.g., CX-Programmer) to the built-in EtherNet/IP port through the switching hub.



Connecting Cable

Use the following cable to connect the CJ2 CPU Unit to the computer running the Support Software.

Port at Unit	Port at computer	Network type (communications mode)	Model	Length	Remarks
Built-in EtherNet/IP port	Ethernet port	100Base-TX or 10Base-T*1	Commercially available twisted-pair cable*2	100 m (Recommended between hub and nodes.)	---
			Commercially available switching hub*2, *3	---	

*1 Use 100Base-TX when using tag data links.

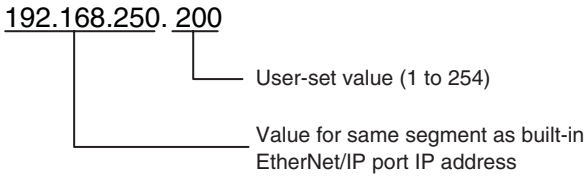
*2 The following table shows the devices recommended for use with the built-in EtherNet/IP port.

Part	Manufacturer	Model number	Inquires
Switching Hub	Cisco Systems, Inc.	Consult the manufacturer.	Cisco Systems, Inc. Main Corporate HQ
	Contec USA, Inc.	Consult the manufacturer.	CONTEC USA Inc.
	Phoenix Contact	Consult the manufacturer.	Phoenix Contact USA Customer Service
Twisted-pair cable	**100Base-TX**		
	Fujikura	F-LINK-E 0.5mm × 4P	Fujikura America, Inc.
	EtherNet/IP compliant cable		---
Connectors (Modular plug)	**STP Plug**		
	Panduit Corporation	MPS588	Panduit Corporation US Headquarters
Boots	Tsuko Company	MK boot (IV) LV	Tsuko Company Japan Headquarters

*3 Always use a switching hub when using tag data links in the network. If a repeater hub is used for EtherNet/IP tag data links (cyclic communications), the network's communications load will increase, data collisions will occur frequently, and stable communications will be impossible.

Before Connecting

To connect by Ethernet, first set the personal computer IP address in advance as shown in the following example.

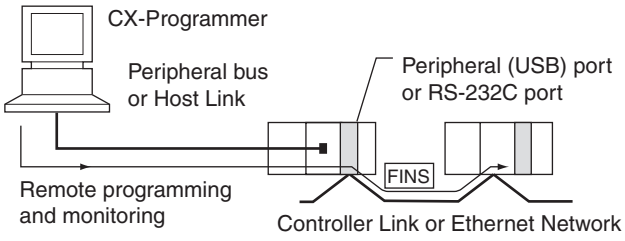


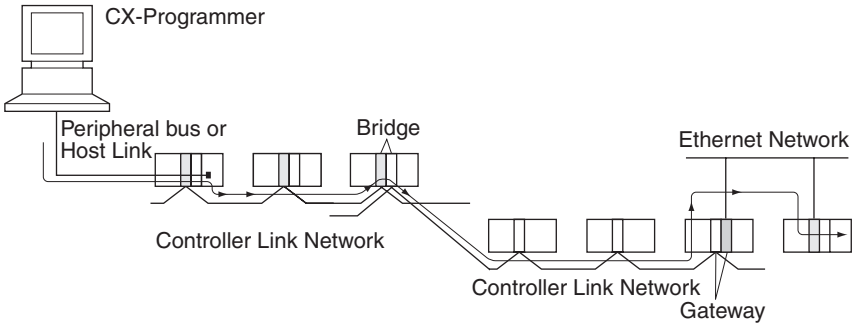
CX-Programmer Settings

The method for connecting the PLC to the personal computer is set using the CX-Programmer. For details on using the CX-Programmer to set the connection method, refer to the *CJ2 CPU Unit Software User's Manual* (Cat. No. W473).

Additional Information

- The CX-Programmer can be used for remote programming and monitoring. It can be used to program and monitor not only the PLC to which it is directly connected, but also to program and monitor any PLC connected through a Controller Link or Ethernet network to which the PLC that the CX-Programmer is connected to is a part of. All programming and monitoring functionality for the directly connected PLC is supported for remote programming and monitoring. For details, refer to *11-2 Serial Communications* and *11-3 Communications Networks* in the *CJ2 CPU Unit Software User's Manual* (Cat. No. W473).





Precautions for Correct Use

Connecting to a Programming Device though the built-in EtherNet/IP port will not be possible if the following errors occur:

- I/O bus error
- Too many I/O points error
- Duplicated number error
- Duplicated rack number error
- I/O setting error

If any of the above errors occurs and connecting to the Programming Device though the built-in EtherNet/IP port is not possible, connect through the USB port.

5

Installation

This section describes how to install and wire a CJ2 PLC.

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5-2 Installation 5-4

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5-1 Fail-safe Circuits

Be sure to set up safety circuits outside of the PLC to prevent dangerous conditions in the event of errors in the PLC or external power supply.

Order of Powering Up the CPU Unit and Controlled System

Outputs from Units such as DC Output Units may malfunction momentarily when the power to the PLC is turned ON. This may cause problems in the system if the PLC's power supply is turned ON after the controlled system's power supply. To prevent possible malfunctions, add an external circuit that prevents the power supply to the controlled system from going ON before the power supply to the PLC itself.

Managing CPU Unit Errors

When any of the following errors occurs, PLC operation will stop and all outputs from Output Units will be turned OFF.

- Operation of the Power Supply Unit's overcurrent protection circuit
- A CPU error (watchdog timer error) or CPU on standby
- A fatal error (memory error, Memory Card error, I/O bus error, duplicated number error, too many I/O points error, I/O setting error, program error, cycle time too long error, or FALS(007) error)*1

Be sure to add any circuits necessary outside of the PLC to ensure the safety of the system in the event of an error that stops PLC operation.

*1 When a fatal error occurs, all outputs from Output Units will be turned OFF even if the IOM Hold Bit has been turned ON to protect the contents of I/O memory. (When the IOM Hold Bit is ON, the outputs will retain their previous status after the PLC has been switched from RUN/MONITOR mode to PROGRAM mode.)

Managing Output Malfunctions

It is possible for an output to remain ON due to a malfunction in the internal circuitry of the Output Unit, such as a relay or transistor malfunction. Be sure to add any circuits necessary outside of the PLC to ensure the safety of the system in the event that an output fails to go OFF.

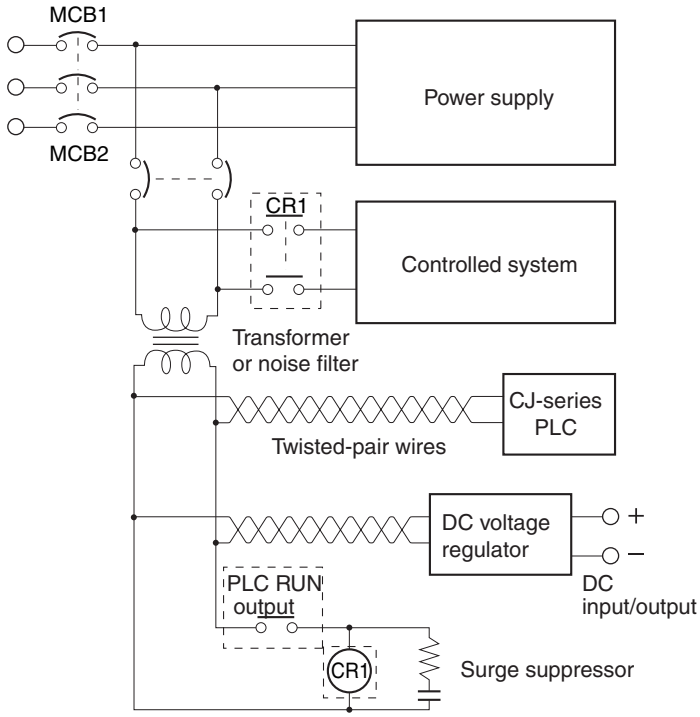
Emergency Stop Circuit

The following emergency stop circuit controls the power supply to the controlled system so that power is supplied to the controlled system only when the PLC is operating and the RUN output is ON.

An external relay (CR1) is connected to the RUN output from the Power Supply Unit*1 as shown in the following diagram.

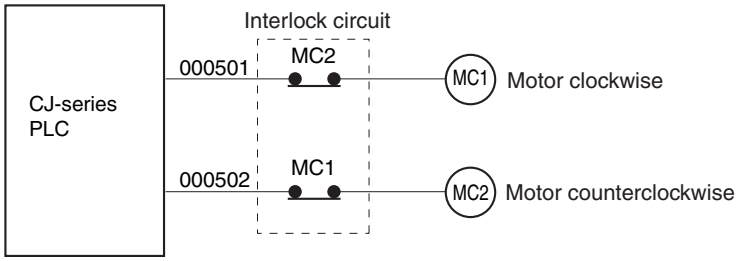
*1 A RUN output is provided only on the CJ1W-PA205R Power Supply Unit. When a Power Supply Unit without a RUN output is used, program the Always ON Flag (A1) as the execution condition for an output point from an Output Unit.

● Electrical Diagram



Interlock Circuits

When the PLC controls an operation such as the clockwise and counterclockwise operation of a motor, provide an external interlock such as the one shown in the following example to prevent both the forward and reverse outputs from turning ON at the same time.



This circuit prevents outputs MC1 and MC2 from both being ON at the same time even if both CIO 000501 and CIO 000502 are ON, so the motor is protected even if the PLC is programmed improperly or malfunctions.

5-2 Installation

5-2-1 Installation and Wiring Precautions

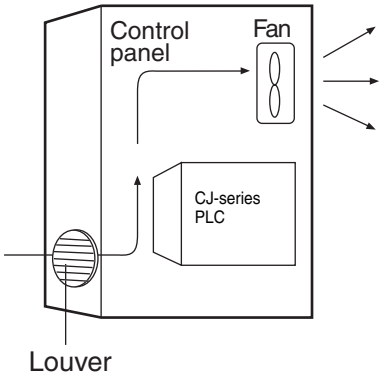
Installation in Cabinets or Control Panels

When the PLC is being installed in a cabinet or control panel, be sure to provide proper ambient conditions as well as access for operation and maintenance.

● Temperature Control

The ambient temperature within the enclosure must be within the operating range of 0°C to 55°C. When necessary, take the following steps to maintain the proper temperature.

- Provide enough space for good air flow.
- Do not install the PLC above equipment that generates a large amount of heat such as heaters, transformers, or high-capacity resistors.
- If the ambient temperature exceeds 55°C, install a cooling fan or air conditioner.

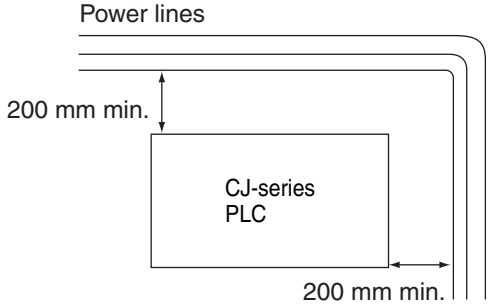


● Accessibility for Operation and Maintenance

- To ensure safe access for operation and maintenance, separate the PLC as much as possible from high-voltage equipment and power machinery.
- The PLC will be easiest to install and operate if it is mounted at a height of 1.0 to 1.6 m above the floor.

● Improving Noise Resistance

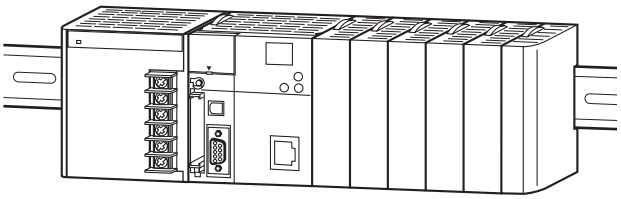
- Do not mount the PLC in a control panel containing high-voltage equipment.
- Install the PLC at least 200 mm (6.5 feet) from power lines.



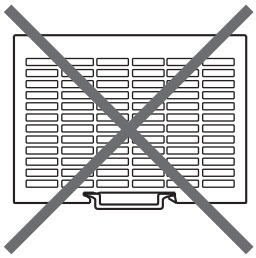
- Ground the mounting plate between the PLC and the mounting surface.
- When I/O Connecting Cables are 10 m or longer, connect the control panels in which Racks are mounted with heavier power wires (3 wires at least 2 mm^2 in cross-sectional area).

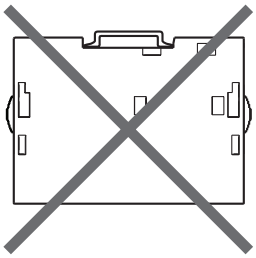
PLC Orientation

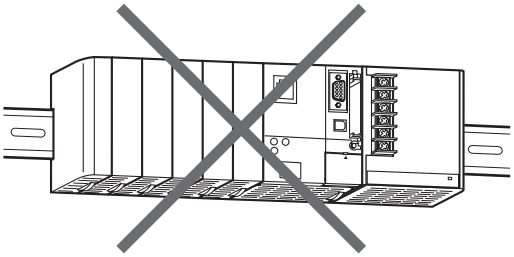
- Each Rack must be mounted in an upright position to provide proper cooling.

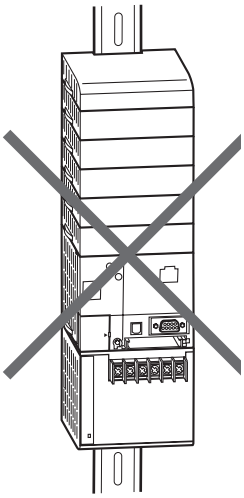


- Do not install a Rack in any of the following positions.









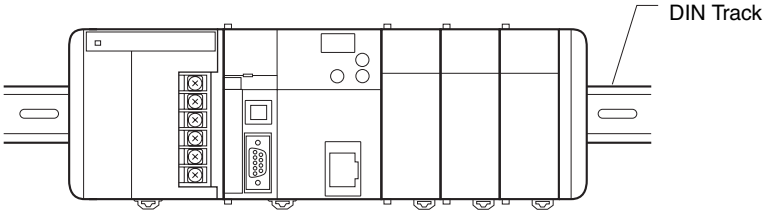
Precautions for Safe Use

Always use the standard installation method. A nonstandard installation will decrease heat dissipation, and may delay the replacement notification signal (in particular for Power Supply Units with Replacement Notification (CJ1W-PA205C)), or degrade or damage the internal elements.

5-2-2 Installation in a Control Panel

Control Panel Installation Dimensions

A CJ-series PLC must be mounted inside a control panel on DIN Track. Normally the CPU Rack is installed on top and the Expansion Racks under it.

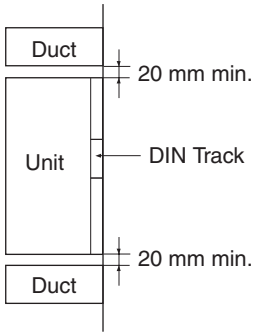


- Consider the width of wiring ducts, wiring, ventilation, and Unit replacement when determining the space between Racks.

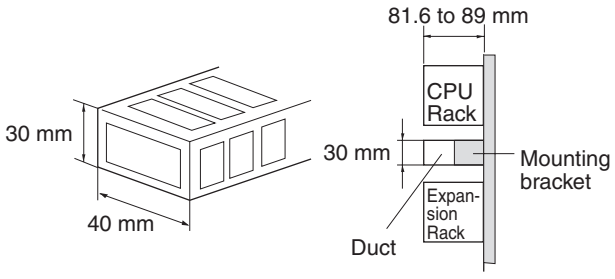
Additional Information

A CJ-series PLC must be mounted on DIN Track. It cannot be mounted with screws.

- Whenever possible, route I/O wiring through wiring ducts or raceways. Install the duct so that it is easy to fish wire from the I/O Units through the duct. It is handy to have the duct at the same height as the Racks.



● Wiring Ducts



Precautions for Correct Use

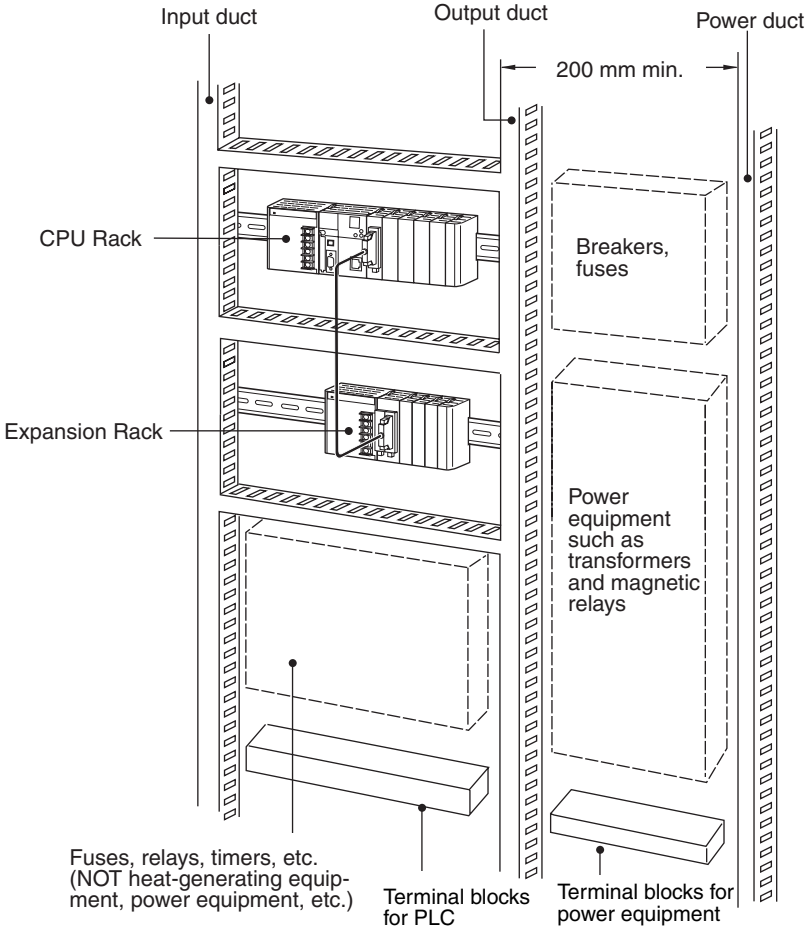
Tighten terminal block screws and cable screws to the following torques.

Terminal Screws
M4:1.2 N·m
M3:0.5 N·m

Cable Connector Screws
M2.6:0.2 N·m

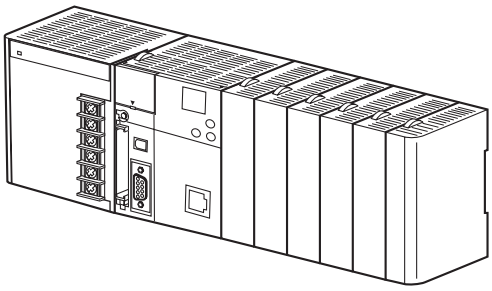
Routing Wiring Ducts

Install the wiring ducts at least 20 mm between the tops of the Racks and any other objects, (e.g., ceiling, wiring ducts, structural supports, devices, etc.) to provide enough space for air circulation and replacement of Units.



5-2-3 Assembled Appearance and Dimensions

The CJ-series Units, including the Power Supply Unit, the CPU Unit, and I/O Units, are connected to each other and an End Cover is connected to the right end.



Dimensions (Unit: mm)

The width of the Power Supply Unit when computing the width of a Rack, is “a.”

Name	Model number	Specifications	Unit width
Power Supply Unit	CJ1W-PA205R	100 to 240 VAC, 25 W	80 mm
	CJ1W-PA205C	100 to 240 VAC, 25 W	80 mm
	CJ1W-PA202	100 to 240 VAC, 14 W	45 mm
	CJ1W-PD025	24 VDC, 25 W	60 mm
	CJ1W-PD022	24 VDC, 19.6 W	27 mm

CPU Unit width: b

Name	Model number	Specifications	Unit width
CPU Unit	CJ2H-CPU68-EIP	I/O points: 2,560 Program capacity: 400 Ksteps	79.8 mm
	CJ2H-CPU67-EIP	I/O points: 2,560 Program capacity: 250 Ksteps	
	CJ2H-CPU66-EIP	I/O points: 2,560 Program capacity: 150 Ksteps	
	CJ2H-CPU65-EIP	I/O points: 2,560 Program capacity: 100 Ksteps	
	CJ2H-CPU64-EIP	I/O points: 2,560 Program capacity: 50 Ksteps	

Other than the CPU Units and Power Supply Units, CJ-series Units come in four widths: 20 mm, 31 mm, 51 mm, and 79.8 mm.

20-mm-wide Units

Name	Model number	Unit width
I/O Control Unit	CJ1W-IC101	20 mm
32-point Basic I/O Units	CJ1W-ID231/ID232	
	CJ1W-OD231/OD232/OD233	
B7A Interface Units	CJ1W-B7A22 CJ1W-B7A14 CJ1W-B7A04	
CompoBus/S Master Unit	CJ1W-SRM21	
Space Unit	CJ1W-SP001	

31-mm-wide Units

Name	Model number	Unit width
I/O Interface Unit	CJ1W-II101	31 mm
8-point and 16-point Basic I/O Units	CJ1W-ID201 CJ1W-ID211 CJ1W-IA111/201 CJ1W-OD20□ CJ1W-OD211/212 CJ1W-OC201/211 CJ1W-OA201	
32-point Basic I/O Units	CJ1W-MD231 CJ1W-MD232/233	
64-point Basic I/O Units	CJ1W-ID261 CJ1W-OD261 CJ1W-MD261	
	CJ1W-ID262 CJ1W-OD262/263 CJ1W-MD263 CJ1W-MD563	
Interrupt Input Unit	CJ1W-INT01	
Quick-response Input Unit	CJ1W-IDP01	
Analog I/O Units	CJ1W-ADG41 CJ1W-AD□□□-V1 CJ1W-DA□□□ CJ1W-MAD42	
Process I/O Units	CJ1W-AD04U CJ1W-PH41U CJ1W-PTS51/52/15/16 CJ1W-PDC15	
Temperature Control Units	CJ1W-TC□□□	
Position Control Units	CJ1W-NC113/133 CJ1W-NC213/233 CJ1W-NC413/433	
MECHATROLINK-II Position Control Unit	CJ1W-NCF71	
High-speed Counter Unit	CJ1W-CT021	
ID Sensor Units	CJ1W-V680C11 CJ1W-V680C12 CJ1W-V600C11 CJ1W-V600C12	
Controller Link Unit	CJ1W-CLK23	
Serial Communications Units	CJ1W-SCU41-V1 CJ1W-SCU21-V1 CJ1W-SCU31-V1	
Ethernet Unit	CJ1W-ETN21	
DeviceNet Unit	CJ1W-DRM21	
CompoNet Master Unit	CJ1W-CRM21	
FL-net Unit	CJ1W-FLN22	

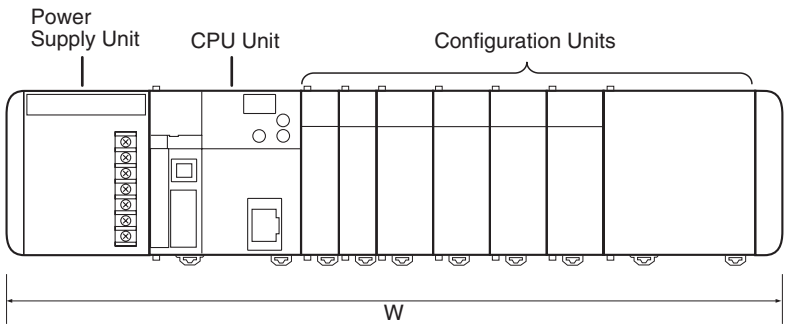
51-mm-wide Units

Name	Model number	Unit width
SYSMAC SPU Unit (High-speed Data Storage Unit)	CJ1W-SPU01-V2	51 mm

79.8-mm-wide Units

Name	Model number	Unit width
MECHATROLINK-II Motion Control Unit	CJ1W-MCH71	79.8 mm

● Design Example for Width W



Power Supply Unit: CJ1W-PA205R (80 mm)

CPU Unit: CJ2H-CPU68-EIP (79.8 mm)

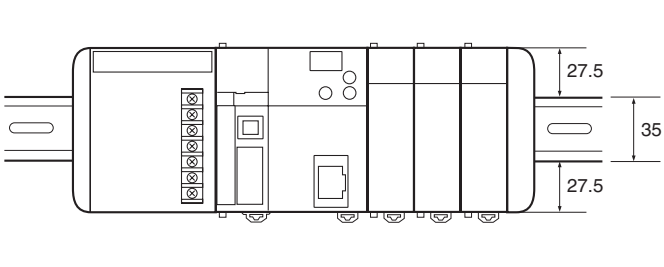
Basic I/O Units: CJ1W-ID231 (20 mm) × 2

Special I/O Units: CJ1W-AD081-V1 (31 mm) × 4

CPU Bus Unit: CJ1W-MCH71 (79.8 mm)

W = 80 + 79.8 + 20 x 2 + 31 × 4 + 79.8 × 1 + 14.7 (End Cover) = 418.3 mm

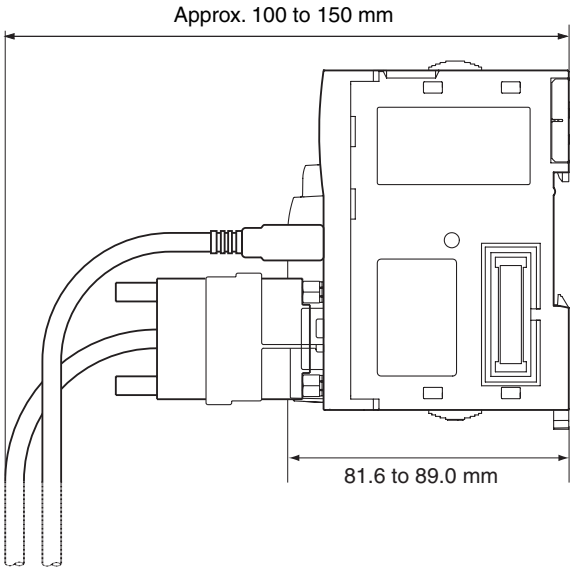
Installation Dimensions (Unit: mm)



DIN Track	A
PFP-100N2	16 mm
PFP-100N	7.3 mm
PFP-50N	7.3 mm

Installation Height

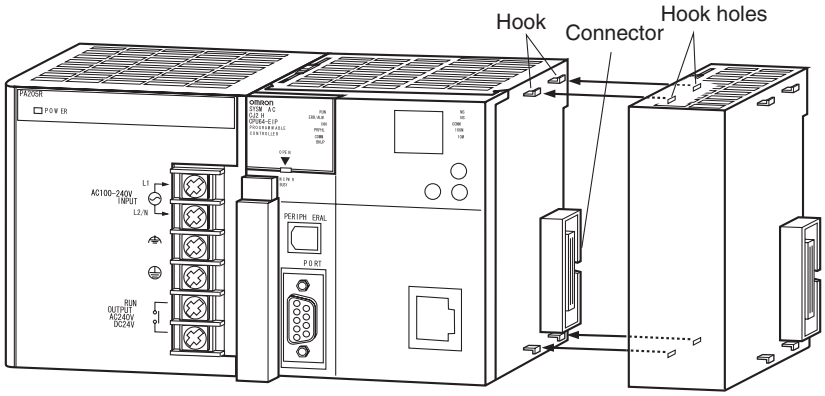
The installation height of the CJ-series CPU Rack and Expansion Racks varies from 81.6 to 89.0 mm, depending on the I/O Units that are mounted. When a Programming Device (e.g., CX-Programmer) is connected, however, even greater height is required. Allow sufficient depth in the control panel containing the PLC.



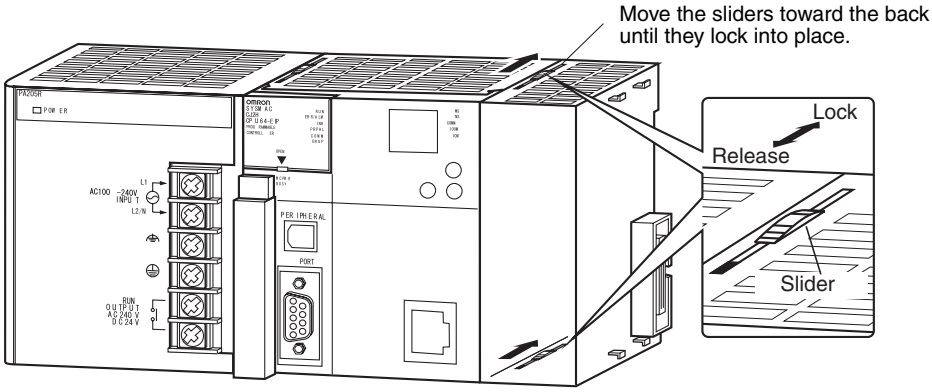
5-2-4 Connecting PLC Components

The Units that make up a CJ-series PLC can be connected simply by pressing the Units together and locking the sliders by moving them toward the back of the Units. The End Cover is connected in the same way to the Unit on the far right side of the PLC.

1. Join the Units so that the connectors fit exactly.



2. The yellow sliders at the top and bottom of each Unit lock the Units together. Move the sliders toward the back of the Units as shown below until they click into place.

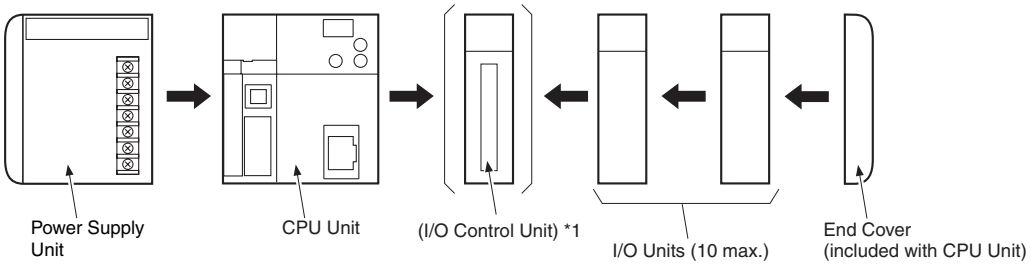


Precautions for Correct Use

If the locking tabs are not secured properly, the connectors may become loose and not function properly. Be sure to slide the locking tabs until they are securely in place.

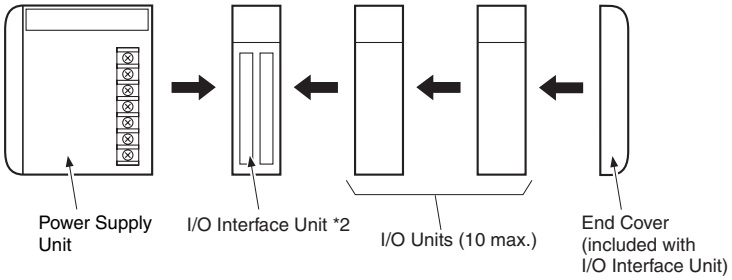
3. Attach the End Cover to the Unit on the far right side of the Rack.

CPU Rack



*1: Connect the I/O Control Unit directly to the CPU Unit to enable connecting Expansion Racks.

Expansion Rack



*2: Connect the I/O Interface Unit directly to the Power Supply Unit.

Additional Information

There is no Backplane for the CJ-series. The PLC is constructed by connecting Units together using the connectors on the sides.

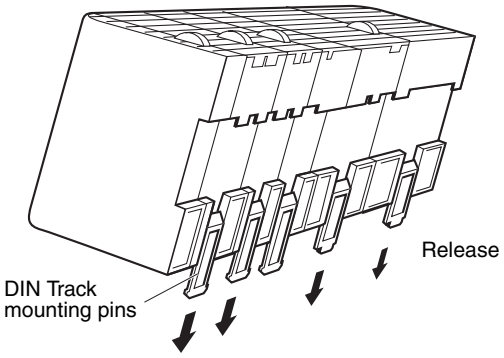
Precautions for Correct Use

- Always turn OFF the power supply before connecting Units to each other.
- Always turn OFF the power supply to the entire system before replacing a Unit.
- A maximum of nine Configuration Units can be connected to a CPU Rack, and a maximum of ten Configuration Units can be connected to an Expansion Rack. If more than the maximum number of Units are connected, a too many I/O points error (fatal error) will occur and the CJ2 CPU Unit will not operate in either RUN or MONITOR mode. If this occurs, The I/O Overflow Flag (A401.11) will turn ON and A407.13 to A407.15 (I/O Overflow Details 2) will turn ON.

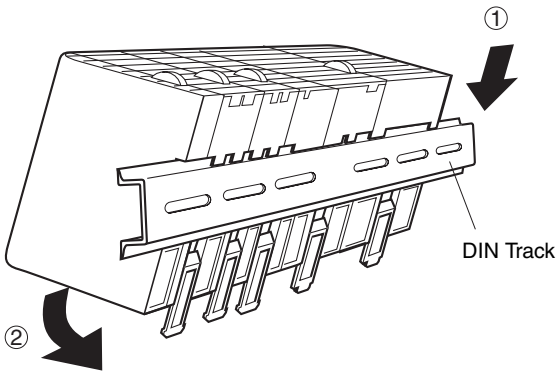
5-2-5 DIN Track Installation

Use the following procedure to install a CJ-series PLC on DIN Track.

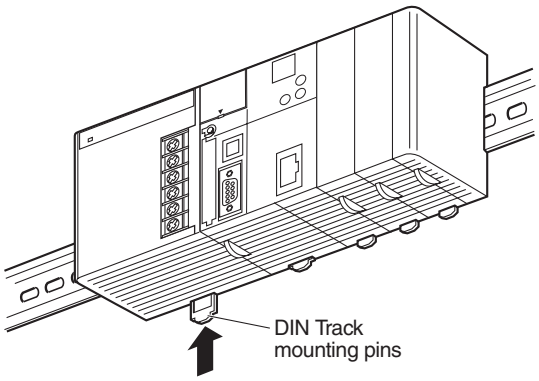
1. Release the pins on the backs of the CJ-series Units.



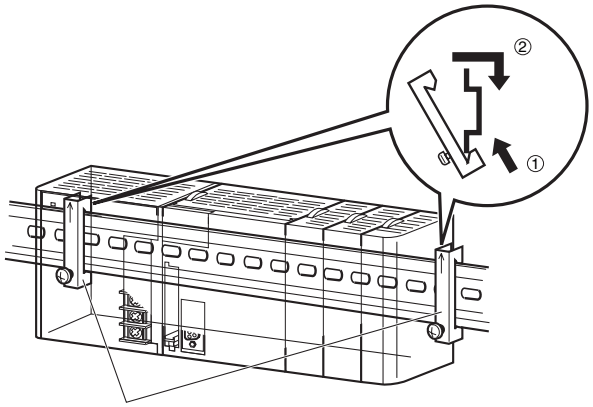
2. Fit the back of the PLC onto the DIN Track by inserting the top of the track and then pressing in at the bottom of the PLC, as shown below.



3. Lock the pins on the backs of the CJ-series Units.



4. Install a DIN Track End Plate on each end of the PLC. To install an End Plate, hook the bottom on the bottom of the track, rotate the Plate to hook the top of the Plate on the top of the track, and then tighten the screw to lock the Plate in place.

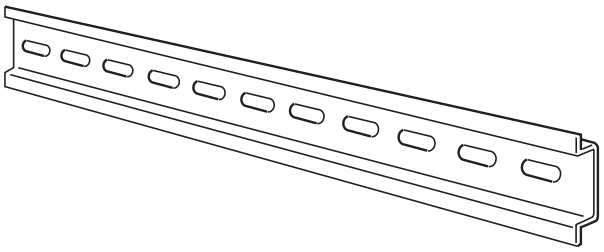


End Plates

DIN Track and Accessories

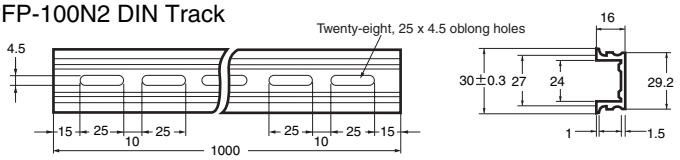
Use the DIN Track and DIN Track End Plates shown below. Secure each DIN Track inside a control panel with at least three screws.

- DIN Track
  Model numbers: PFP-50N (50 cm), PFP-100N (100 cm), PFP-100N2 (100 cm)

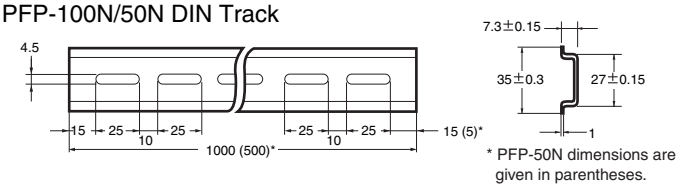


Secure the DIN Track to the control panel using M4 screws separated by 210 mm (6 holes) or less and using at least 3 screws. The tightening torque is 1.2 N·m.

PFP-100N2 DIN Track

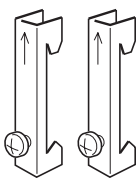


PFP-100N/50N DIN Track



* PFP-50N dimensions are given in parentheses.

- PFP-M DIN Track End Plates (2 required)



5-2-6 Connecting CJ-series Expansion Racks

CS/CJ-series I/O Connecting Cables are used to connect the CPU Rack and Expansion Racks.

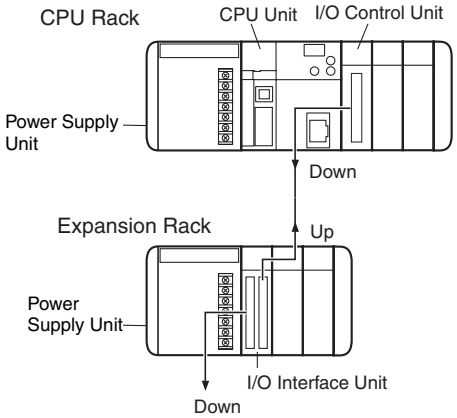
● CS/CJ-series I/O Connecting Cables



- These connectors are equipped with easy-lock connectors.
- Use them to connect the CPU Rack to an Expansion Rack or to connect two Expansion Racks.

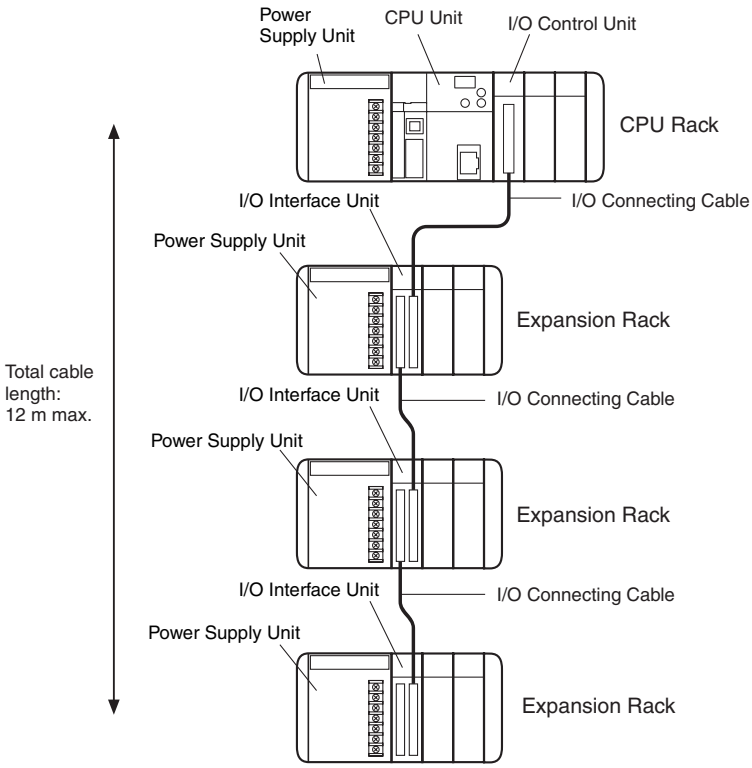
Model number	Cable length
CS1W-CN313	0.3 m
CS1W-CN713	0.7 m
CS1W-CN223	2 m
CS1W-CN323	3 m
CS1W-CN523	5 m
CS1W-CN133	10 m
CS1W-CN133B2	12 m

- The CJ-series I/O Connecting Cables are used to connect the I/O Control Unit on the CPU Rack to the I/O Interface Unit on an Expansion Rack or to connect the I/O Interface Units on two Expansion Racks.
- Install the Racks and select I/O Connecting Cables so that the total length of all I/O Connecting Cables does not exceed 12 m.
- The following diagram shows where each I/O Connecting Cable must be connected on each Rack. The Rack will not operate if the cables aren't connected properly. (The "up" direction is towards the CPU Unit and "down" is away from the CPU Unit.)



Cable Connections

The following diagram shows examples of proper Rack connections. Connect the simple lock connectors to the I/O Control Unit on the CJ-series CPU Rack and the I/O Interface Unit on the CJ-series Expansion Rack.

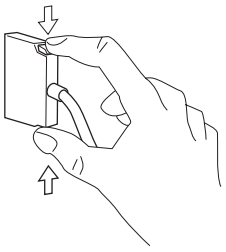


- The top and bottom of the connector are different. Be sure the connector is facing the correct direction before connecting it.

Connecting the Simple Locking Connectors

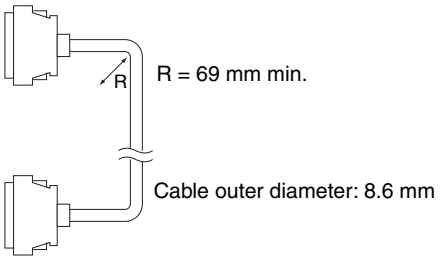
Press the tabs on the end of the connector and insert the connector until it locks in place. The PLC will not operate properly if the connector isn't inserted completely.

To remove the connector, press the tabs and pull on the connector.

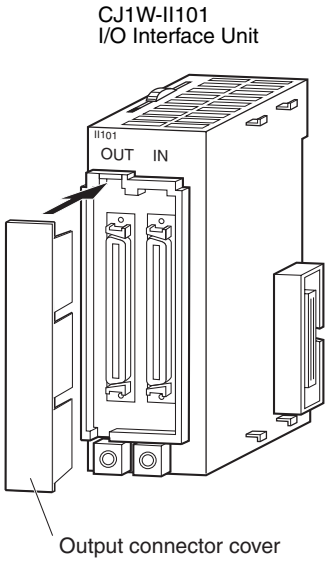


Precautions for Correct Use

- When using an I/O Connecting Cable with a locking connector, be sure that the connector is firmly locked in place before using it.
- Always turn OFF the power supply to the PLC before connecting a cable.
- An I/O bus error will occur and the PLC will stop if an I/O Connecting Cable's connector separates from the Rack. Be sure that the connectors are secure.
- A 63-mm hole will be required if the I/O Connecting Cable must pass through a hole when connecting an Expansion Rack.
- Do not bend the I/O Connecting cable past its natural bending radius or pull in it with excessive force.
- The cables can withstand a pulling force up to 49 N (11 lbs), so be sure that they are not pulled too forcefully.
- The I/O Connecting Cables mustn't be bent too severely. The minimum bending radii are shown in the following diagram.



- Always attach the cover to the output connector (left side) on the last I/O Interface Unit on the last Expansion Rack to protect it from dust.

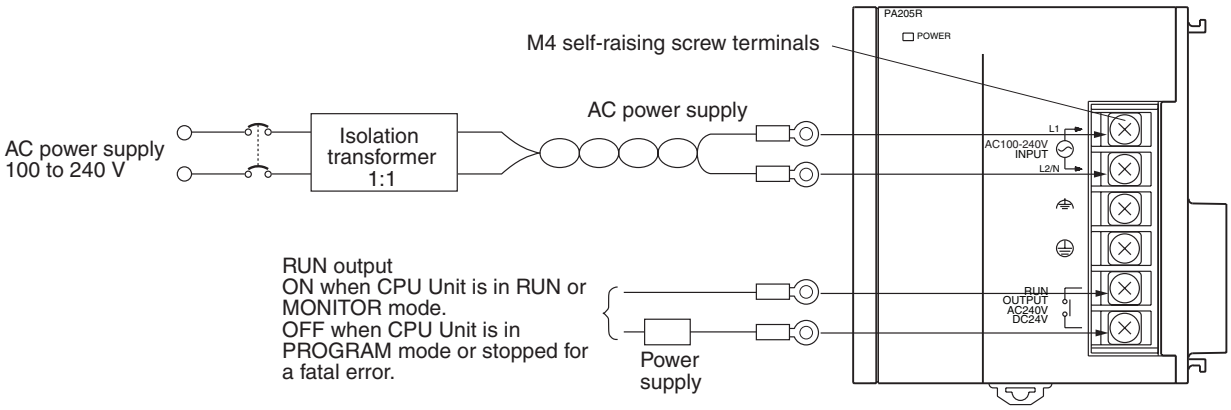


5-3 Wiring

5-3-1 Power Supply Wiring

AC Power Supply Units

● CJ1W-PA205R Power Supply Unit



Additional Information

The RUN output function is enabled only when mounted to a CPU Rack.

● AC Power Source

- Supply 100 to 240 VAC.
- Keep voltage fluctuations within the specified range:

Supply voltage	Allowable voltage fluctuations
100 to 240 VAC	85 to 264 VAC

- If one power supply phase of the equipment is grounded, connect the grounded phase side to the L2/N terminal.

● Isolation Transformer

The PLC's internal noise isolation circuits are sufficient to control typical noise in power supply lines, but noise between the PLC and ground can be significantly reduced by connecting a 1-to-1 isolation transformer. Do not ground the secondary coil of the transformer.

● Power Supply Capacity

The power consumption will be 100 VA max. per Rack for the CJ1W-PA205R/PA205C and 50 VA for the CJ1W-PA202, but there will be a surge current of at least 5 times the max. current when power is turned ON.

● RUN Output

The RUN output is provided only on the CJ1W-PA25R Power Supply Unit. This output is ON whenever the CPU Unit is operating in RUN or MONITOR mode; it is OFF when the CPU Unit is in PROGRAM mode or a fatal error has occurred (including execution of the FALS(007) instruction).

The RUN output can be used to control external systems, such as in an emergency stop circuit that turns off the power supply to external systems when the PLC is not operating. (Refer to *5-1 Fail-safe Circuits* for more details on the emergency stop circuit.)

Item	CJ1W-PA205R
Contact form	SPST-NO
Maximum switching capacity	240 VAC: 2 A for resistive loads 120 VAC: 0.5 A for inductive loads 24 VDC:2 A for resistive loads 24 VDC:2 A for inductive loads

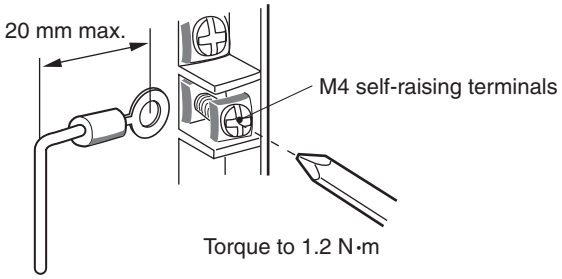
● Crimp Terminals

The terminals on the Power Supply Unit are M4, self-raising terminals with screws.

Precautions for Correct Use

- Use crimp terminals for wiring.
- Do not connect bare stranded wires directly to terminals.
- Tighten the terminal block screws to the torque of 1.2 N·m.
- Use round-type crimp terminals (M4) having the dimensions shown below.
  - Crimp Terminals for AC Power Supplies





⚠ Caution

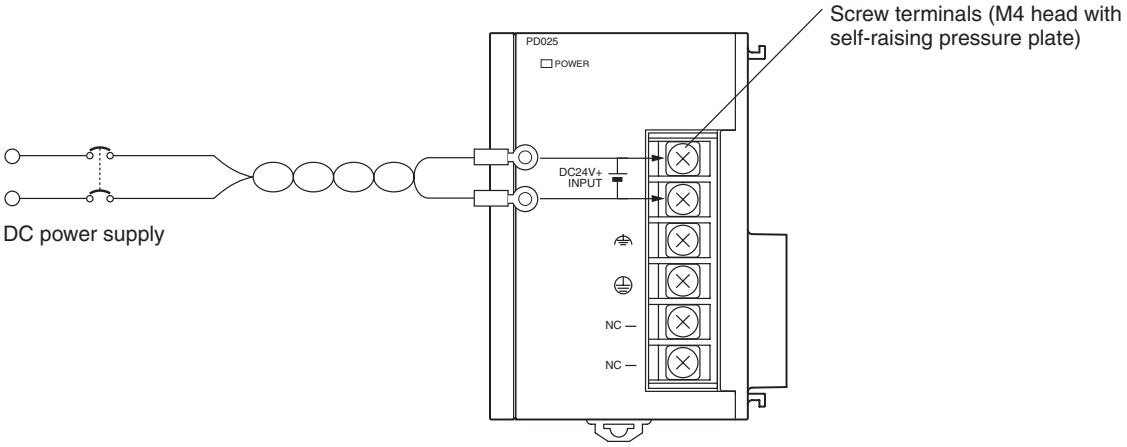
Tighten the AC power supply terminal block screws to the torque of 1.2 N·m. Loose screws may result in short-circuit, malfunction, or fire.

Precautions for Safe Use

- Supply power to all of the Power Supply Units from the same source.
- Do not remove the protective label from the top of the Unit until wiring has been completed. This label prevents wire strands and other foreign matter from entering the Unit during wiring procedures.
- Do not forget to remove the label from the top of the Power Supply Unit after wiring the Unit. The label will block air circulation needed for cooling.

DC Power Supplies

● CJ1W-PD025 Power Supply Unit



● DC Power Source

Supply 24 VDC. Keep voltage fluctuations within the specified range.

Model	Allowable voltage fluctuation range
CJ1W-PD025	19.2 to 28.8 VDC (±20%)
CJ1W-PD022	21.6 to 26.4 VDC (±10%)

● Power Supply Capacity

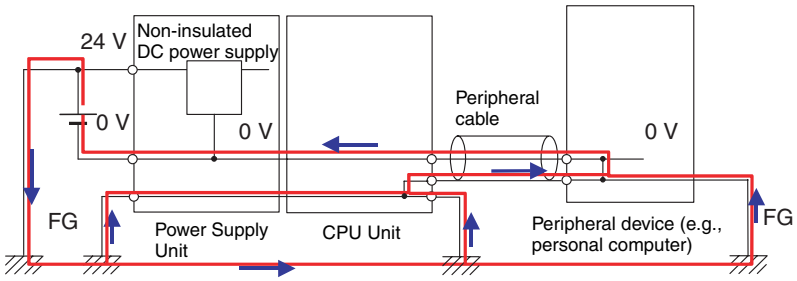
The maximum power consumption is 50 W (PD025)/35 W (PD022) per Rack, but there will be a surge current of about five times that level when the power is turned ON.

● Precautions when Using CJ1W-PD022 Non-insulated Power Supply Units

⚠ Caution

When connecting a personal computers or other peripheral devices to a PLC to which a non-insulated Power Supply Unit (CJ1W-PD022) is mounted, either ground the 0 V side of the external power supply or do not ground the external power supply at all ground. A short-circuit will occur in the external power supply if incorrect grounding methods are used. Never ground the 24 V side, as shown below.

Wiring in Which the 24-V Power Supply Will Short



● Crimp Terminals

The terminals on the Power Supply Unit are M4, self-raising terminals with screws.

Precautions for Correct Use

- Use crimp terminals for wiring.
- Do not connect bare stranded wires directly to terminals.
- Tighten the terminal block screws to the torque of 1.2 N·m.
- Use crimp terminals (M4) having the dimensions shown below.

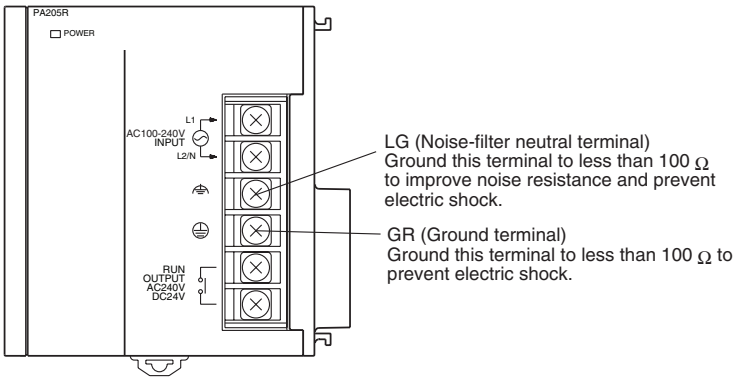
Crimp Terminals for DC Power Supplies



Precautions for Safe Use

- Be sure not to reverse the positive and negative leads when wiring the power supply terminals.
- Supply power to all of the Power Supply Units from the same source.
- Do not remove the protective label from the top of the Unit until wiring has been completed. This label prevents wire strands and other foreign matter from entering the Unit during wiring procedures.
- Do not forget to remove the label from the top of the Power Supply Unit after wiring the Unit. The label will block air circulation needed for cooling.

Grounding


PA205R
POWER
L1
AC100-240V INPUT
L2/N
RUN OUTPUT AC240V DC24V
LG (Noise-filter neutral terminal)
Ground this terminal to less than 100 Ω to improve noise resistance and prevent electric shock.
GR (Ground terminal)
Ground this terminal to less than 100 Ω to prevent electric shock.

- To help prevent electrical shock, ground the ground terminal (GR: ⏚) with a ground resistance of less than 100 Ω using a 14-gauge wire (minimum cross-sectional area of 2 mm^2).
- The line ground terminal (LG: ⏚) is a noise-filtered neutral terminal. If noise is a significant source of errors or electrical shocks are a problem, connect the line ground terminal to the ground terminal and ground both with a ground resistance of less than 100 Ω.
- The ground wire should not be more than 20 m long.
- The CJ-series PLCs are designed to be mounted so that they are isolated (separated) from the mounting surface to protect them from the effects of noise in the installation environment (e.g., the control panel).
- Do not share the PLC's ground with other equipment or ground the PLC to the metal structure of a building. The configuration shown in the following diagram may worsen operation.

● Crimp Terminals

The terminals on the Power Supply Unit are M4, self-raising terminals with screws.

Precautions for Correct Use

- Use crimp terminals for wiring.
- Do not connect bare stranded wires directly to terminals.
- Tighten the terminal block screws to the torque of 1.2 N·m.
- Use crimp terminals (M4) having the dimensions shown below.

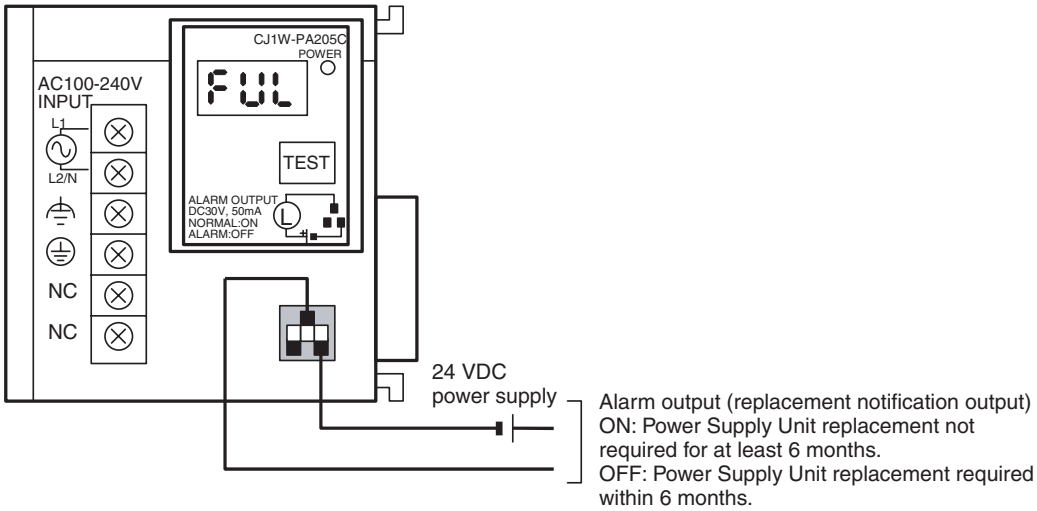
● Crimp Terminals for DC Power Supply



Alarm Output

An alarm output is provided on Power Supply Units with a replacement notification function. Connect the alarm output to a PLC's Input Unit or external LED indicator to enable notification when Power Supply Unit replacement is required.

● CJ1W-PA205C Power Supply Unit



● Output Specifications

- ON (normal): Power Supply Unit replacement not required for at least 6 months.
- OFF: Power Supply Unit replacement required within 6 months.
- Transistor open-collector outputs
- Maximum switching capacity: 30 VDC max., 50 mA max.
- ON: Residual voltage of 2 V max., OFF: Leakage current of 0.1 mA max.

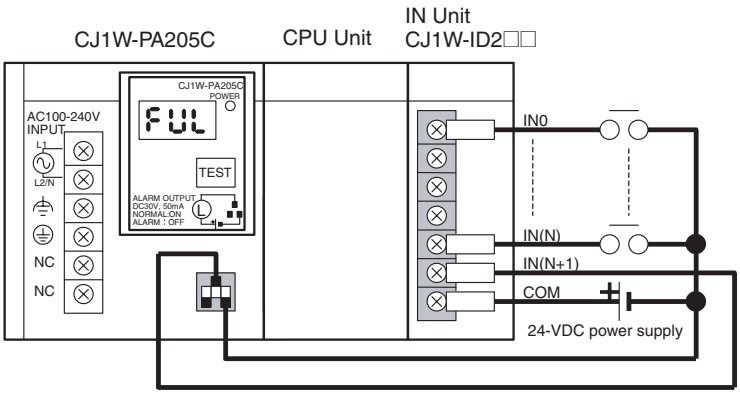
Wiring

The following wire gauges are recommended.

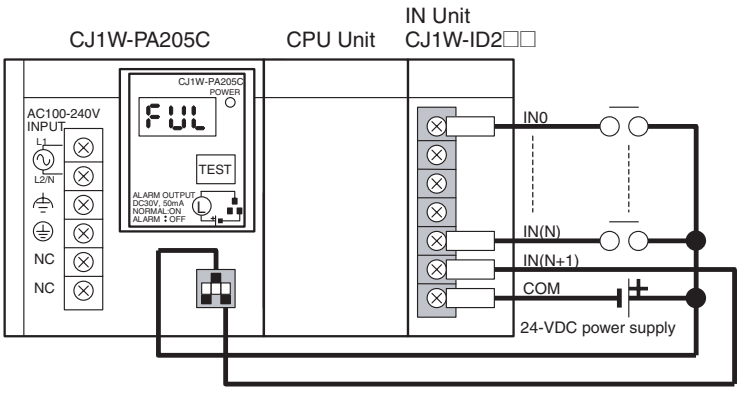
Recommended wire size	Use	Pushing strength (clamping operation)	Pulling strength (holding force)	Length of stripped section
AWG 22 to 18 (0.32 to 0.82 mm^2)	Connecting to PLC terminal block models	30 N max.	30 N min.	7 to 10 mm
AWG 28 to 24 (0.08 to 0.2 mm^2)	Connecting to PLC connector models		10 N min.	

PLC Input Unit Wiring Example

Connect the positive terminals of the 24-VDC power supply to the Input Unit common (COM) terminals.

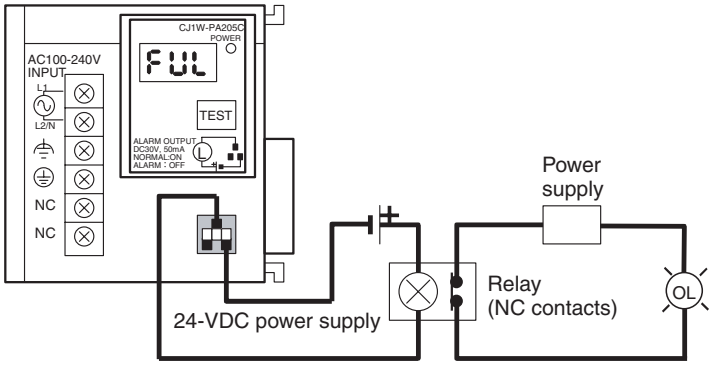


Connect the negative terminal of the 24-VDC power supply to the Input Unit common (COM) terminal.



External Display Device Connection Example

The alarm output (replacement notification output) is an NC contact. Therefore, wire the alarm output using an NC contact or other means to turn ON an error indicator or LED display as shown in the following diagram.



Note The OL display will also light if the PLC's power supply fails.

Precautions for Safe Use

- Separate the alarm output cables from power lines and high-voltage lines.
- Do not apply a voltage or connect a load to the alarm output that exceeds the rated voltage or load.

5-3-2 Wiring CJ-series Basic I/O Units with Terminal Blocks

Precautions for Wiring I/O Units

I/O Unit Specifications

Double-check the specifications for the I/O Units. In particular, do not apply a voltage that exceeds the input voltage for Input Units or the maximum switching capacity for Output Units. Doing so may result in breakdown, damage, or fire.

When the power supply has positive and negative terminals, be sure to wire them correctly.

Electric Wires

- The following wire gauges are recommended.

Terminal Block Connector	Wire Size
18-terminal	AWG 22 to 18 (0.32 to 0.82 mm^2)

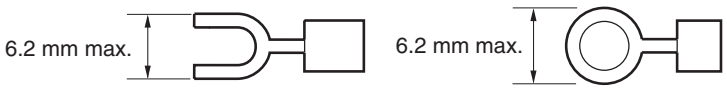
- The current capacity of electric wire depends on factors such as the ambient temperature and insulation thickness as well as the gauge of the conductor.

Crimp Terminals

The terminals on the I/O Unit are M3, self-raising terminals with screws.

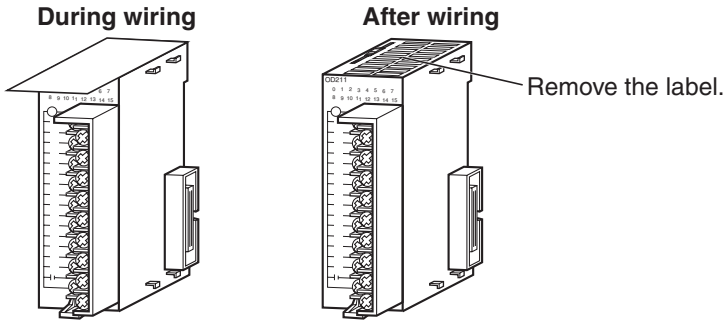
Precautions for Correct Use

- Use crimp terminals for wiring.
- Do not connect bare stranded wires directly to terminals.
- Tighten the terminal block screws to the torque of 0.5 N·m.
- Use crimp terminals (M3) having the dimensions shown below.

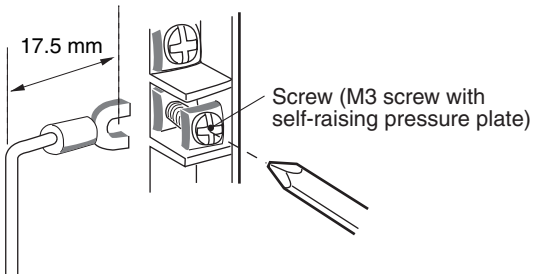


Wiring

- Make sure that all Units are connected properly.
- Do not remove the protective label from the top of the Unit until wiring has been completed.
- This label prevents wire strands and other foreign matter from entering the Unit during wiring procedures.
- Remove the label after wiring has been completed to allow air circulation needed for cooling.

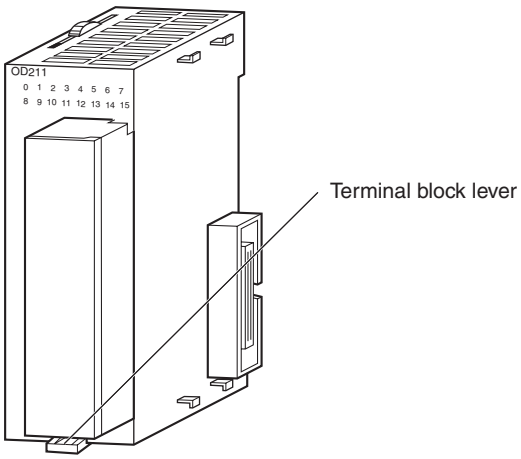


- Wire the Units so that they can be easily replaced.
- Make sure that the I/O indicators are not covered by the wiring.
- Do not place the wiring for I/O Units in the same duct or raceway as power lines. Inductive noise can cause errors in operation.
- Tighten the terminal screws to the torque of 0.5 N·m.



Terminal Blocks

- The I/O Units are equipped with removable terminal blocks. The lead wires do not have to be removed from the terminal block to remove it from an I/O Unit.
- After you complete wiring, check to see if the terminal block is securely locked.



CJ-series Basic I/O Unit

5-3-3 Wiring Basic I/O Units with Connectors

This section describes wiring for CJ-series Basic I/O Units with connectors (32- and 64-point Units). Depending on the connector, the following methods are used to connect these Units to external I/O devices.

- Use an OMRON Connecting Cable (equipped with a special connector) to connect to a Terminal Block or Relay Terminal.
- Use a special connector and user-provided cable.



Precautions for Safe Use

- Be sure not to apply a voltage that exceeds the input voltage for Input Units or the maximum switching capacity for Output Units.
- When the power supply has positive and negative terminals, be sure to wire them correctly. Loads connected to Output Units may malfunction if the polarity is reversed.
- Use reinforced insulation or double insulation on the DC power supply connected to DC I/O Units when required by EC Directives (low voltage).
- When connecting the connector to the I/O Unit, tighten the connector screws to a torque of 0.2 N·m.
- Turn ON the power after checking the connector's wiring.
- Do not pull the cable. Doing so will damage the cable.
- Bending the cable too sharply can damage or break wiring in the cable.



Additional Information

CJ-series Basic I/O Units with Fujitsu connectors have the same connector pin allocations as the C200H High-density I/O Units and CS-series I/O Units with connectors to make them compatible.

Connecting to a Connector-Terminal Block Conversion Unit or I/O Relay Terminal

For details on using OMRON Connecting Cables equipped with special connectors to connect Basic I/O Units with connectors to OMRON Connector-Terminal Block Conversion Units or I/O Relay Terminals, refer to *A-1-4 Connecting Connector-Terminal Block Conversion Units and I/O Relay Terminals*.

Using User-made Cables with Connector

● Available Connectors

Use the following connectors when assembling a connector and cable.

CJ-series 32- and 64-point Basic I/O Units with Fujitsu-compatible Connectors

Applicable Units

Model	Specifications	Pins
CJ1W-ID231	Input Unit, 24 VDC, 32 inputs	40
CJ1W-ID261	Input Unit, 24 VDC, 64 inputs	
CJ1W-OD231	Transistor Output Unit with Sinking Outputs, 32 outputs	
CJ1W-OD261	Transistor Output Unit with Sinking Outputs, 64 outputs	
CJ1W-MD261	24-VDC Input/Transistor Output Units, 32 Inputs, 32 Outputs	
CJ1W-MD231	24-VDC Input/Transistor Output Units, 16 Inputs, 16 Outputs	24

Applicable Cable-side Connectors

Connection	Pins	OMRON set	Fujitsu parts
Solder-type	40	C500-CE404	Socket: FCN-361J040-AU Connector cover: FCN-360C040-J2
	24	C500-CE241	Socket: FCN-361J024-AU Connector cover: FCN-360C024-J2
Crimped	40	C500-CE405	Socket: FCN-363J040 Connector cover: FCN-360C040-J2 Contacts: FCN-363J-AU
	24	C500-CE242	Socket: FCN-363J024 Connector cover: FCN-360C024-J2 Contacts: FCN-363J-AU
Pressure-welded	40	C500-CE403	FCN-367J040-AU
	24	C500-CE243	FCN-367J024-AU/F

CJ-series 32- and 64-point Basic I/O Units with MIL Connectors

Applicable Units

Model	Specifications	Pins
CJ1W-ID232	Input Unit, 24 VDC, 32 inputs	40
CJ1W-ID262	Input Unit, 24 VDC, 64 inputs	
CJ1W-OD232	Transistor Output Unit with sourcing outputs, 32 outputs	
CJ1W-OD262	Transistor Output Unit with sourcing outputs, 64 outputs	
CJ1W-OD233	Transistor Output Unit with sinking outputs, 32 outputs	
CJ1W-OD263	Transistor Output Unit with sinking outputs, 64 outputs	
CJ1W-MD263	24-VDC Input/Transistor Output Units, 32 inputs, 32 outputs	
CJ1W-MD563	TTL Input/TTL Output Units, 32 inputs, 32 outputs	
CJ1W-MD232	24-VDC Input/Transistor Output Units, 16 inputs, 16 outputs	20
CJ1W-MD233	24-VDC Input/Transistor Output Units, 16 inputs, 16 outputs	

Applicable Cable-side Connectors

Connection	Pins	OMRON set	DDK parts
Pressure-welded	40	XG4M-4030-T	FRC5-A040-3T0S
	20	XG4M-2030-T	FRC5-A020-3T0S

Wire Size

We recommend using cable with wire gauges of AWG 24 or AWG 28 (0.2 mm^2 to 0.08 mm^2). Use cable with external wire diameters of 1.61 mm max.

Wiring Procedure

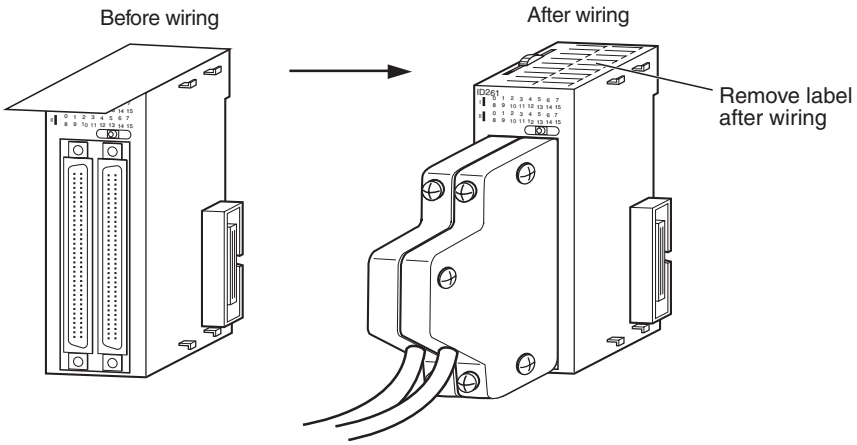
The following wiring procedure is an example for Fujitsu-compatible connectors.

1. Check that each Unit is installed securely.

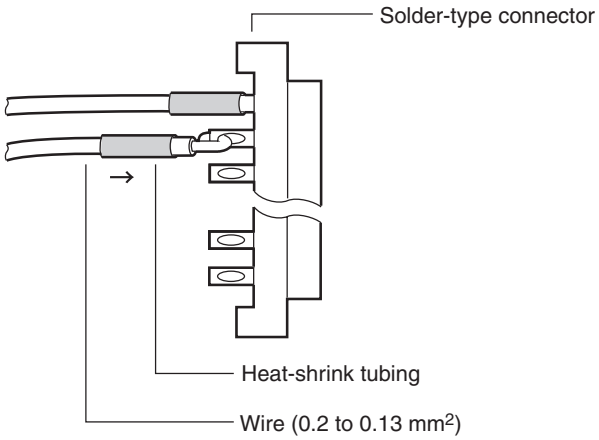
Precautions for Correct Use

Do not force the cables.

2. Do not remove the protective label from the top of the Unit until wiring has been completed. This label prevents wire strands and other foreign matter from entering the Unit during wiring. (Remove the label after wiring has been completed to allow air circulation needed for cooling.)



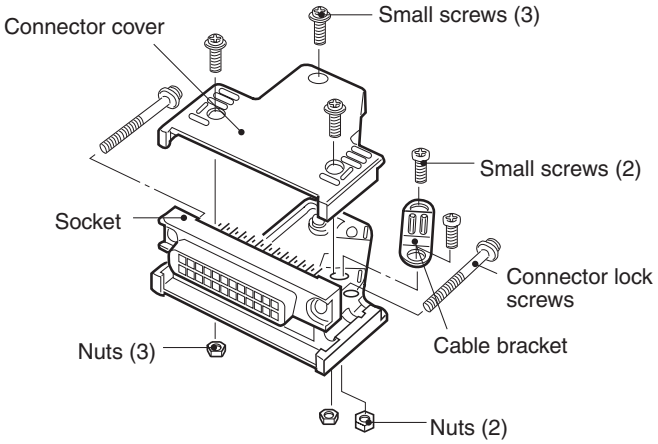
3. When solder-type connectors are being used, be sure not to accidentally short adjacent terminals. Cover the solder joint with heat-shrink tubing.



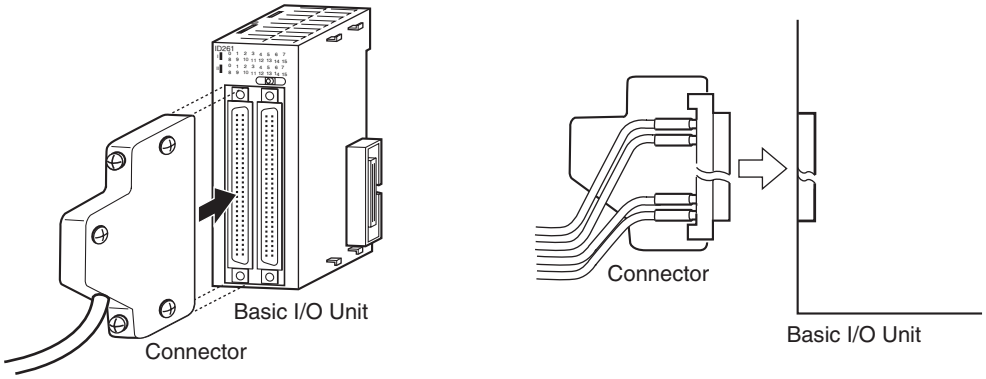
Precautions for Safe Use

Double-check to make sure that the Output Unit's power supply leads have not been reversed. If the leads are reversed, the Unit's internal fuse will blow and the Unit will not operate.

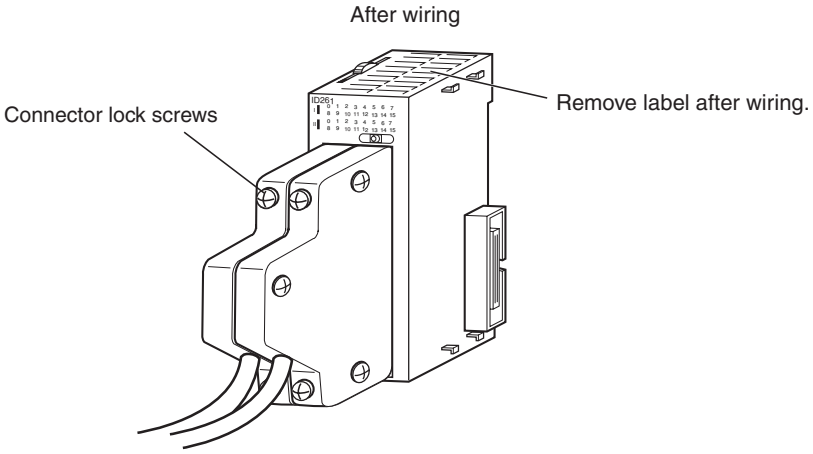
4. Assemble the connector (purchased separately).



5. Insert the wired connector.



6. Remove the protective label after wiring has been completed to allow air circulation needed for cooling.



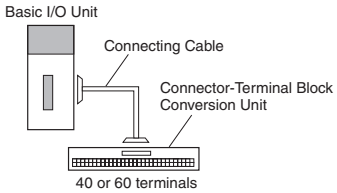
Tighten the connector lock screws to a torque of 0.2 N·m.

5-3-4 Connecting to Connector-Terminal Block Conversion Units or I/O Relay Terminals

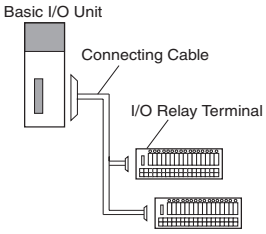
OMRON Connecting Cable can be used to connect Basic I/O Units with Connectors to OMRON Connector-Terminal Block Conversion Units or to OMRON I/O Relay Terminals. For details, refer to *A-1-4 Connecting Connector-Terminal Block Conversion Units and I/O Relay Terminals*.

● Connection Examples

Connector-Terminal Block Conversion Unit



I/O Relay Terminals



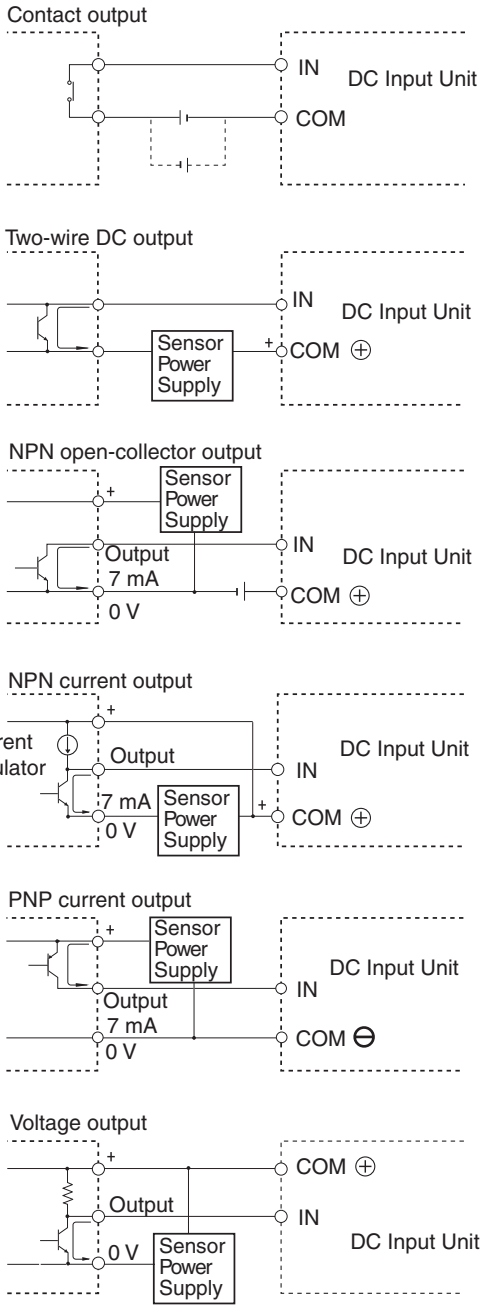
5-3-5 Connecting I/O Devices

Input Devices

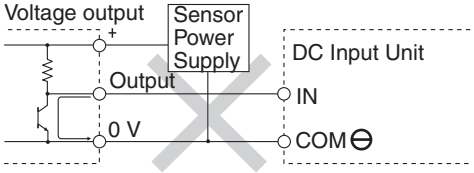
Use the following information for reference when selecting or connecting input devices.

● DC Input Units

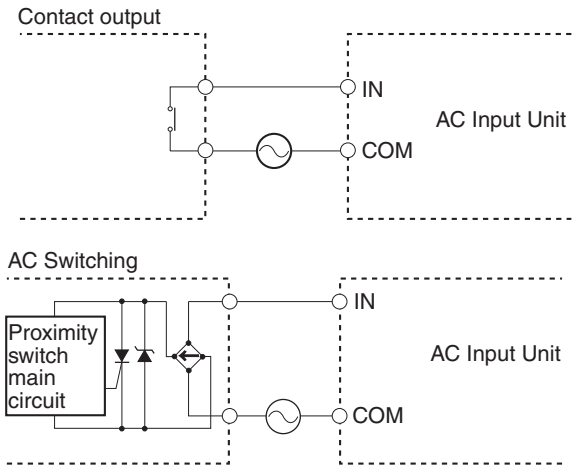
The following types of DC input devices can be connected.



- The circuit below should NOT be used for I/O devices having a voltage output.



AC Input Units



Precautions for Safe Use

When using a reed switch as the input contact for an AC Input Unit, use a switch with an allowable current of 1 A or greater. If reed switches with smaller allowable currents are used, the contacts may fuse due to surge currents.

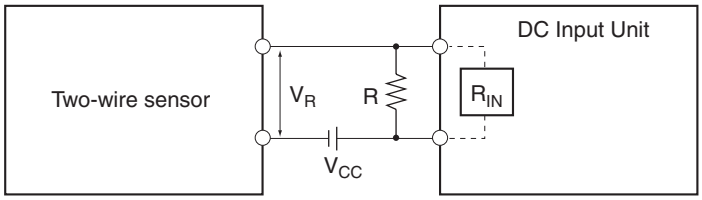
Precautions when Connecting a Two-wire DC Sensor

When using a two-wire sensor with a 12-VDC or 24-VDC input device, check that the following conditions have been met. Failure to meet these conditions may result in operating errors.

- Relation between voltage when the PLC is ON and the sensor residual voltage:
  $V_{ON} \leq V_{CC} - V_R$
- Relation between voltage when the PLC is ON and sensor control output (load current):
  I_{OUT} (min) $\leq I_{ON} \leq I_{OUT}$ (max.)
  $I_{ON} = (V_{CC} - V_R - 1.5$ [PLC internal residual voltage]$)/R_{IN}$

  When I_{ON} is smaller than I_{OUT} (min), connect a bleeder resistor R. The bleeder resistor constant can be calculated as follows:
  $R \leq (V_{CC} - V_R)/(I_{OUT}$ (min.) $- I_{ON})$
  Power $W \geq (V_{CC} - V_R)^2/R \times 4$ [allowable margin]
  V_{CC}: Power voltage
  V_R: Sensor output residual current
  I_{ON}: PLC ON current
  I_{OUT}: Sensor control current (load current)
  R_{IN}: PLC input impedance

- Relation between current when the PLC is OFF and sensor leakage current:
  $I_{OFF} \geq I_{leak}$
  Connect a bleeder resistor if I_{leak} is greater than I_{OFF}. Use the following equation to calculate the bleeder resistance constant.
  $R \leq (R_{IN} \times V_{OFF})/(I_{leak} \times R_{IN} - V_{OFF})$
  Power $W \geq (V_{CC} - V_R)^2/R \times 4$ [allowable margin]



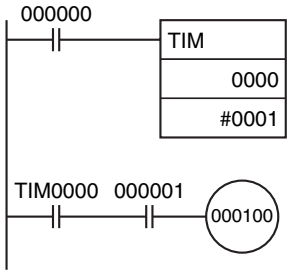
V_{CC}: Power voltage
V_{ON}: PLC ON voltage
V_{OFF}: PLC OFF voltage
I_{ON}: PLC ON current
I_{OFF}: PLC OFF current
R_{IN}: PLC input impedance

V_R: Sensor output residual current
I_{OUT}: Sensor control current (load current)
I_{leak}: Sensor leakage current
R: Bleeder resistance

- Precautions on Sensor Surge Current
  An incorrect input may occur if a sensor is turned ON after the PLC has started up to the point where inputs are possible. Determine the time required for sensor operation to stabilize after the sensor is turned ON and take appropriate measures, such as inserting into the program a timer delay after turning ON the sensor.

● Example

In this example, the sensor's power supply voltage is used as the input to CIO 000000 and a 100-ms timer delay (the time required for an OMRON Proximity Sensor to stabilize) is created in the program. After the Completion Flag for the timer turns ON, the sensor input on CIO 000001 will cause output bit CIO 000100 to turn ON.



Output Wiring Precautions

Output Short-circuit Protection

If a load connected to the output terminals is short-circuited, output components and the printed circuit boards may be damaged. To guard against this, incorporate a fuse in the external circuit. Use a fuse with a capacity of about twice the rated output.

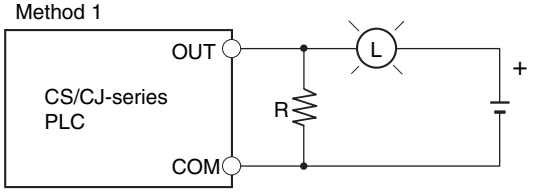
Transistor Output Residual Voltage

A TTL circuit cannot be connected directly to a transistor output because of the transistor's residual voltage. It is necessary to connect a pull-up resistor and a CMOS IC between the two.

Output Surge Current

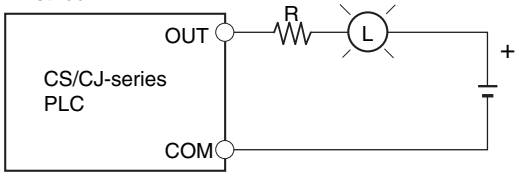
When connecting a transistor or triac output to an output device having a high surge current (such as an incandescent lamp), steps must be taken to avoid damage to the transistor or triac. Use either of the following methods to reduce the surge current.

Method 1



Add a resistor that draws about 1/3 of the current consumed by the bulb.

Method 2



Add a control resistor as shown in the following diagram.

5-3-6 Wiring with Ethernet Cable

Precautions

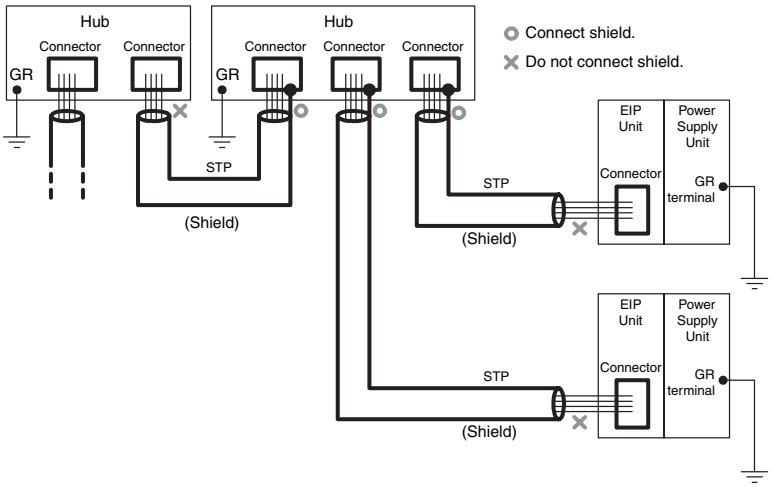
Observe the following precautions when using the CJ2 CPU Unit built-in EtherNet/IP port.

● Basic Installation Precautions

- Take the greatest care when installing the Ethernet System, being sure to follow ISO 8802-3 specifications. You must obtain a copy of these specifications and be sure you understand them before attempting to install an Ethernet System.
- Unless you are already experienced in installing communications systems, we strongly recommend that you employ a professional to install your system.
- Do not install Ethernet equipment near sources of noise. If a noisy environment is unavoidable, take adequate measures against noise interference, such as installing network components in grounded metal cases or using optical cable in the system.
- When installing an EtherNet/IP network that combines an information system with the control system, and the communications load may be heavy due to tag data links, we recommend configuring the network so that the load does not affect communications. For example, install the tag data links in a segment that is separate from the information network.

● Precautions on Laying Twisted-pair Cable

- Noise resistance may be reduced by ground loops, which can occur due to improper shield connections and grounding. Ground the shield at one location, as shown in the following diagram.
- Do not connect the connector shield at the CPU Unit.
- If a cable connects two hubs, connect the shields at only one end.

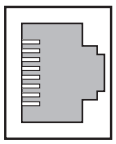


- Press the cable connector in firmly until it locks into place at both the switching hub and the CPU Unit.
- Do not lay the twisted-pair cable together with high-voltage lines.
- Do not lay the twisted-pair cable near devices that generate noise.
- Do not lay the twisted-pair cable in locations subject to high temperatures or high humidity.
- Do not lay the twisted-pair cable in locations subject to excessive dirt and dust or to oil mist or other contaminants.

Ethernet Connectors

The following standards and specifications apply to the connectors for the Ethernet twisted-pair cable.

- Electrical specifications:Conform to IEEE802.3 standards.
- Connector structure:RJ45 8-pin Modular Connector (Conforms to ISO 8877)

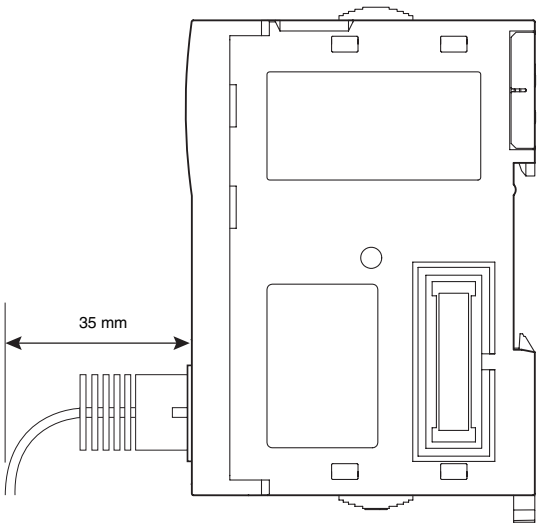


Connector pin	Signal name	Abbr.	Signal direction
1	Transmission data +	TD+	Output
2	Transmission data –	TD–	Output
3	Reception data +	RD+	Input
4	Not used.	---	---
5	Not used.	---	---
6	Reception data –	RD–	Input
7	Not used.	---	---
8	Not used.	---	---
Hood	Frame ground	FG	---

Connecting the Cable

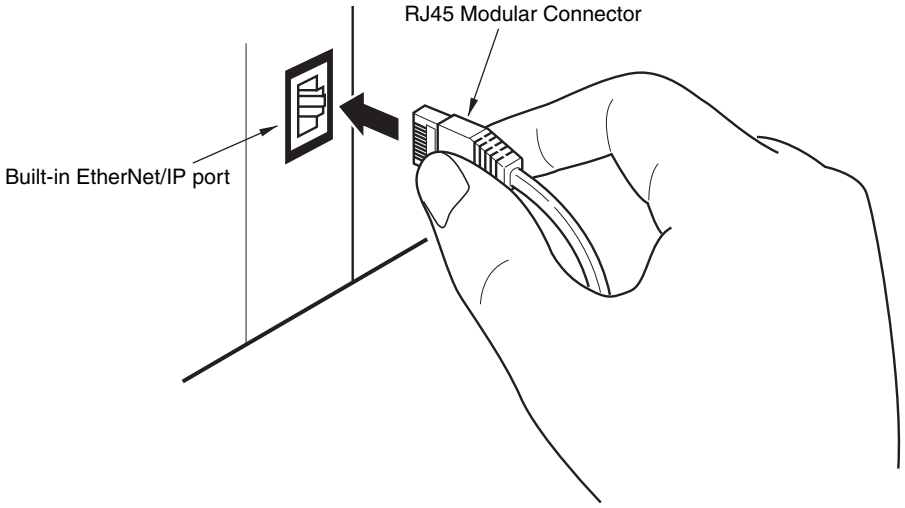
Precautions for Correct Use

- Turn OFF the PLC's power supply before connecting or disconnecting twisted-pair cable.
- Allow enough space for the bending radius of the twisted-pair cable as shown in below.



1. Lay the twisted-pair cable.
2. Connect the cable to the switching hub. Be sure to press in the cable until it locks into place.

3. Connect the twisted-pair cable to the connector on the built-in EtherNet/IP port at the CPU Unit. Be sure to press the connectors at both the switching hub end and Ethernet end until they lock into place.



5-4 Control Panel Installation

To ensure system reliability and safety, the system must be designed and configured according to the installation environment (temperature, humidity, vibration, shock, corrosive gases, overcurrent, noise, etc.).

5-4-1 Temperature

Panels have been reduced in size due to space-saving and miniaturization in devices and systems, and the temperature inside the panel may be at least 10°C to 15°C higher than outside the panel. Implement the following measures against overheating at the installation site and in the panel, and allow a sufficient margin for the temperature.

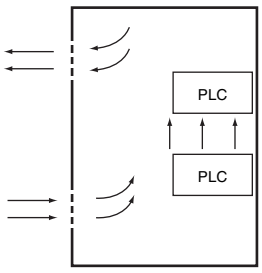
High Temperatures

Use the following cooling methods as required, taking into account the ambient temperature and the amount of heating inside the panel.

● Natural Cooling

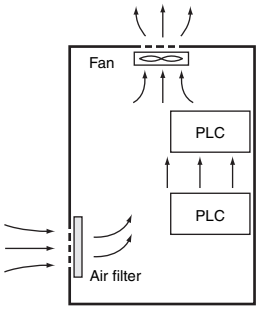
Natural cooling relies on natural ventilation through slits in the panel, rather than using cooling devices such as fans or coolers. When using this method, observe the following points.

- Do not install the PLC at the top of the panel, where hot air tends to stagnate.
- To provide ventilation space above and below the PLC, leave sufficient distance from other devices, wiring ducts, etc.
- Do not mount the Units in the wrong direction (e.g., vertically or upside down). Doing so may cause abnormal heating in the PLC.
- Do not install heat-generating equipment, such as heaters, transformers, and devices with high resistance, directly above the panel.
- Do not install the PLC in a location exposed to direct sunlight.



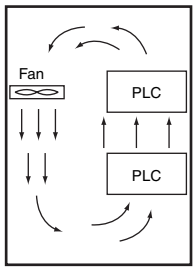
Natural Cooling

● Forced Ventilation (by Fan at Top of Panel)



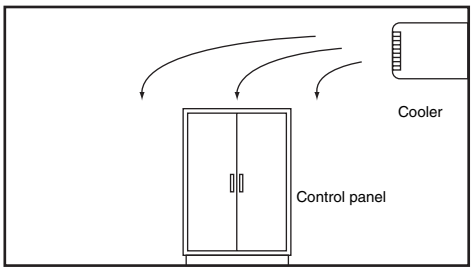
Forced Ventilation Method

● Forced Air Circulation (by Fan in Closed Panel)



Forced Air Circulation

● Room Cooling (Cooling the Entire Room Where the Control Panel Is Located)



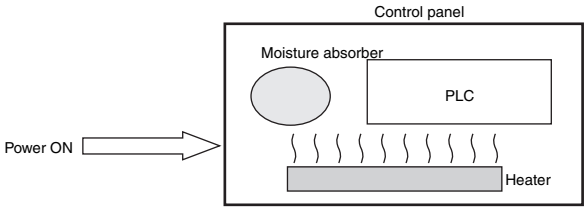
Room Cooling

Low Temperatures

The PLC will not start normally if the temperature is below 0°C when the power is turned ON. Maintain an air temperature of at least approximately 5°C inside the panel, by implementing measures such as installing a low-capacity space heater in the panel. Alternatively, leave the PLC power ON to keep the PLC warm.

5-4-2 Humidity

Rapid temperature changes can cause condensation to occur, resulting in malfunctioning due to short-circuiting. When there is a possibility of this occurring, take measures against condensation, such as leaving the PLC power ON at night or installing a heater in the control panel to keep it warmer.



Examples of Measures against Condensation

5-4-3 Vibration and Shock

The PLC is tested for conformity with the sine wave vibration test method (IEC 60068-2-6) and the shock test method (IEC 60068-2-27) of the Environmental Testing for Electrotechnical Products. It is designed so that malfunctioning will not occur within the specifications for vibration and shock. If, however, the PLC is to be used in a location in which it will be directly subjected to regular vibration or shock, then implement the following countermeasures:

- Either separate the control panel from the source of the vibration or shock, or secure the PLC and the panel with rubber padding to prevent vibration.
- Make the building or the floor vibration-resistant.
- To prevent shock during operation to devices in the panel, such as electromagnetic contactors, secure either the source of the shock or the PLC with rubber padding.

5-4-4 Atmosphere

Using the PLC in any of the following locations can cause defective contact with connectors and corrosion of components. Implement countermeasures such as purging the air as required.

- In locations exposed to dust, dirt, salt, metal filings, soot, or organic solvents, use a panel with an airtight structure. Be careful of temperature increases inside the panel.
- In locations exposed to corrosive gas, purge the air inside the panel to clear the gas and then pressurize the inside of the panel to prevent gas from entering from outside.
- In locations where flammable gas is present, either use an explosion-protected construction or do not use the PLC.

5-4-5 Electrical Environment

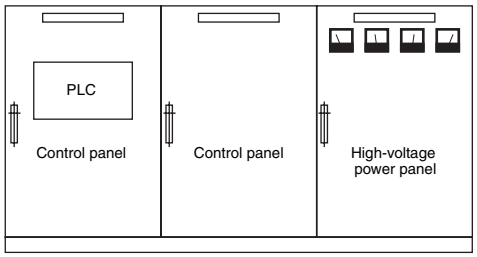
When installing or wiring devices, make sure that there will be no danger to people and that noise will not interfere with electrical signals.

PLC Installation Location

Install the PLC as far away as possible from high-voltage (600 V or higher) and power devices to ensure safe operation and maintenance.

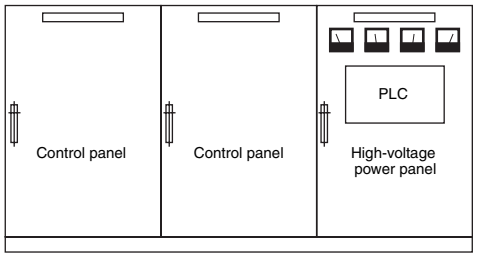
Example of Recommended Equipment Arrangement

OK



Example of Poor Equipment Arrangement

NG

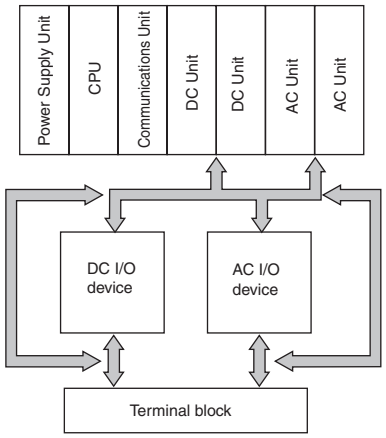


Examples of Equipment Arrangement in Panel with High-voltage Devices

Arrangement of PLC and Units

Observe the following points.

- Place a Unit that does not generate much noise next to the CPU Unit, such as an Input Unit or Communications Unit.
- The coils and contacts in electromagnetic contactors and relays in an external circuit are sources of noise. Locate them at least 100 mm away from the PLC.

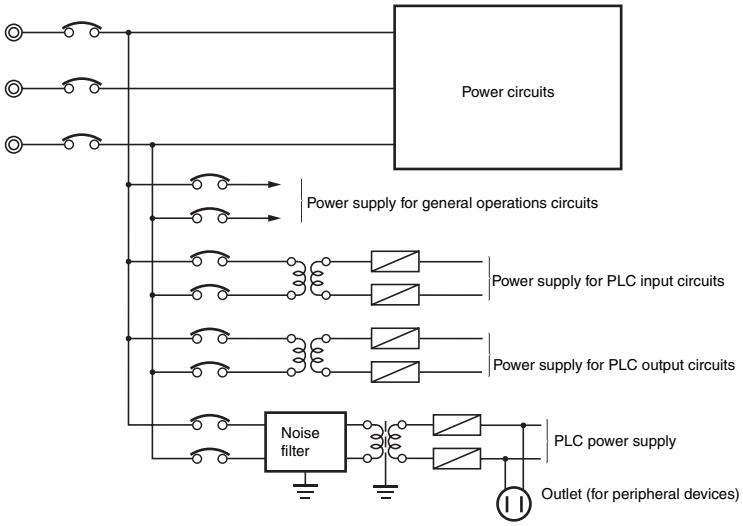


Example of Arrangement in Panel

Wire Layout for the Power Supply System

Observe the following points when wiring the power supply system.

- Separate the PLC power supply from the I/O device power supply and install a noise filter near the PLC power supply feed section.
- Use an isolating transformer to significantly reduce noise between the PLC and the ground. Install the isolating transformer between the PLC power supply and the noise filter, and do not ground the secondary coil of the transformer.
- Keep the wiring between the transformer and the PLC as short as possible, twist the wires well, and keep the wiring separate from high-voltage and power lines.

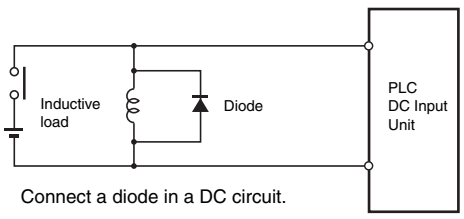

Power circuits
Power supply for general operations circuits
Power supply for PLC input circuits
Power supply for PLC output circuits
Noise filter
PLC power supply
Outlet (for peripheral devices)

Power Supply System Diagram

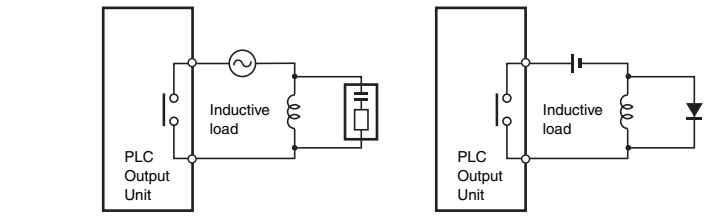
Wiring External I/O Signal Lines

Observe the following points when wiring external I/O signal lines.

- To absorb reverse electromotive force when an inductive load is connected to an output signal, connect a surge suppressor near the inductive load in an AC circuit, and connect a diode near the inductive load in a DC circuit.

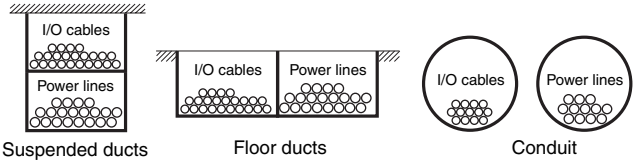


Input Signal Noise Countermeasures


Inductive load
PLC Output Unit
Connect a surge suppressor in an AC circuit.
Inductive load
PLC Output Unit
Connect a diode in a DC circuit.

Output Signal Noise Countermeasures

- Never bundle output signal lines with high-voltage or power lines, and do not route them in close proximity or parallel to such lines. If output signal lines must be routed in close proximity to such lines, place them in separate ducts or conduits and be sure to ground the ducts or conduits.



I/O Cable Arrangement

- If the signal lines and power lines cannot be routed in separate ducts, use shielded cable. Connect the shield to the ground terminal at the PLC, and leave it unconnected at the input device.

- Wire the lines so that common impedance does not occur. Such wiring will increase the number of wires, so use common return circuits. Use thick wires with sufficient allowance for the return circuits, and bundle them with lines of the same signal level.
- For long I/O lines, wire the input and output signal lines separately.
- Use twisted-pair wires for pilot lamps (and particularly lamps with filaments).
- Use countermeasures, such as CR surge absorbers and diodes, for input device and output load device noise sources, as required.

External Wiring

Wiring, and noise countermeasures in particular, are based on experience, and it is necessary to closely manage wiring based on experience and information in the manuals.

● Wiring Routes

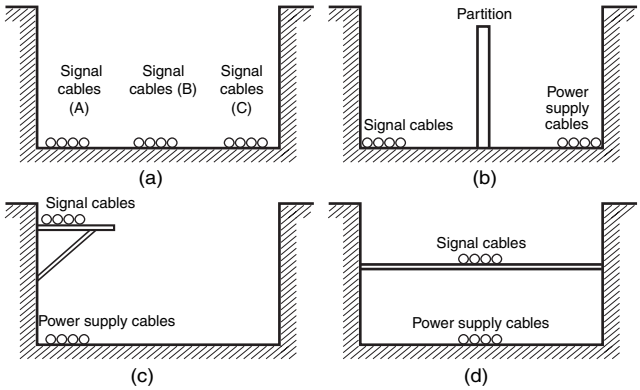
Each of the following combinations include different signal types, properties, or levels. They will cause the signal-to-noise ratio to drop due to factors such as electrical induction. As a general rule when wiring, either use separate cables or separate wiring routes for these items. Future maintenance operations and changes to the system will also be made easier by carefully organizing the wiring from the start.

- Power lines and signal lines
- Input signals and output signals
- Analog signals and digital signals
- High-level signals and low-level signals
- Communications lines and power lines
- DC signals and AC signals
- High-frequency devices (such as Inverters) and signal lines (communications)

● Wiring Methods

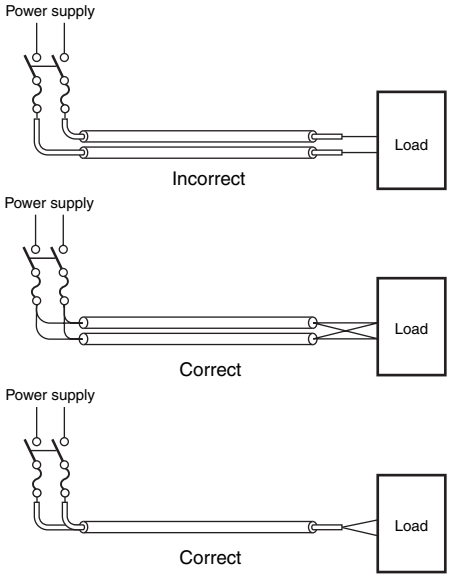
Observe the following points when wiring power supply and signal cables.

- When routing signal cables with differing characteristics through the same duct, always keep them separated.
- As much as possible, avoid routing multiple power supply lines through the same duct. If it cannot be avoided, then construct a partition between them in the duct and ground the partition.



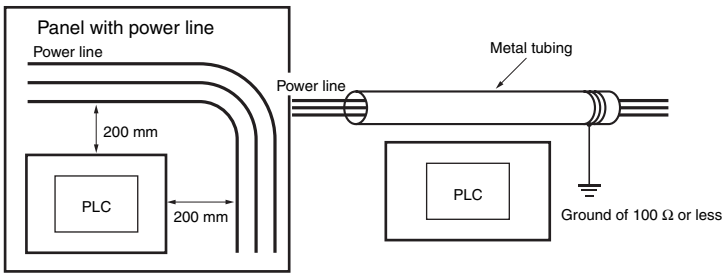
Partitioning Methods for Signal and Power Supply Cables

- To avoid overheating the conduits when using conduits for wiring, do not place wires for a single circuit in separate conduits.



Parallel Wiring (Single Phase)

- Power cables and signal cables adversely affect each other. Do not wire them in parallel.
- Noise induction may occur if the PLC is installed in a panel that includes high-voltage devices. Whenever possible, wire and install them separately. (Refer to *PLC Installation Location* on page 42.)
- Either install the PLC a minimum of 200 mm from high-voltage lines or power lines, or place the high-voltage lines or power lines in metal tubing and completely ground the metal tubing to 100 Ω or less.



Example: Separating PLC from Power Lines

Other Precautions

- Basic I/O Units have both plus and minus commons, so pay attention to the polarity when wiring.
- Optical fiber cable looks like ordinary communications cable or power cable, but internally it consists of fibers, tension members, other protective materials. It must be handled with care. In particular, optical fiber cable must be installed according to prescribed methods and standards. Do not subject optical fiber cable to severe tensile shock, excessive bending, twisting, or excessive constriction. For details on wiring optical fiber cables, refer to the following manuals.
  - SYSMAC H-PCF Optical Fiber Cables Installation Guide (Cat. No. W156)
  - Optical Ring Controller Link Units Operation Manual (Cat. No. W370)

5-4-6 Grounding

Grounding has the following two purposes.

- Protective Grounding
  Protective grounding is done to ensure safety. It is intended to prevent electrical shock by grounding the electrical potential that is generated by factors such as leakage, induction, or failure.
- Functional Grounding
  Functional grounding is done to protect device and system functions, including prevention of noise from external sources, or prevention of noise from devices or equipment that could have harmful effects on other devices or equipment.

  Grounding requirements sometimes depend on the situation, based on experimentation. It is important to sufficiently check the particular circumstances before grounding.

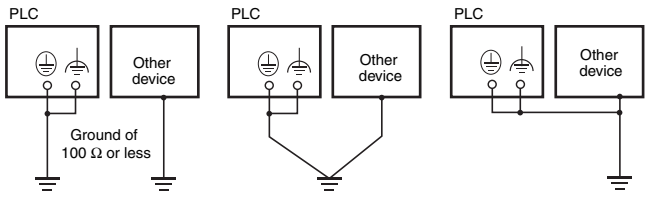
Grounding Methods and Precautions

● Principles of One-point Grounding

For devices to operate properly, the reference potential between the devices must be stabilized. Use one-point grounding so that noise current does not flow to ground lines between the devices.

● Whenever possible, use an independent ground (with the ground pole separated by a minimum of 10 m from any other ground pole).

- Ground to 100 Ω or less, and if possible use a separate ground from those of other devices. (Refer to figure (a) in the diagram below.)
- If using an independent ground is not possible, then use a common ground as shown in figure (b). Connect to the ground pole of the other device.
- Never connect to the same ground as a device that draws a large amount of power, such as a motor or inverter. Ground the devices separately to avoid mutually adverse influences.
- To prevent electrical shock, do not connect to ground poles (especially steel frames) to which multiple devices are connected.
- Use a ground pole as close to the PLC as possible and keep the ground line as short as possible.

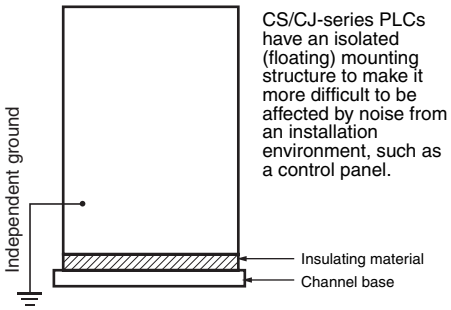


Independent grounds: Best | **Common ground: Acceptable** | **Common ground: Incorrect**

Grounding Methods

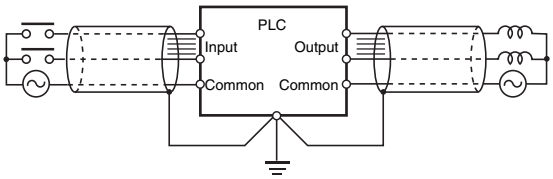
Precautions when Grounding

- If the same ground is used for both the signal lines and the enclosure, isolate the channel base (a grounded metal plate inside a control panel) with an insulating material


CS/CJ-series PLCs have an isolated (floating) mounting structure to make it more difficult to be affected by noise from an installation environment, such as a control panel.
Independent ground
Insulating material
Channel base

Example: Insulating and Grounding an Enclosure

- To prevent influence from leakage current from other electrical devices, electrically isolate the panel in which the PLC is housed from other devices.
- If high-frequency equipment is present, then ground not only the high-frequency equipment but also the panel itself in which the PLC is housed.
- As shown in the following diagram, when using shielded cable for I/O wiring, connect the shield near the PLC to the enclosure ground terminal. Follow the instructions in the Communications Unit manual for preparing shielded communications cable.



Shielded Cable Ground

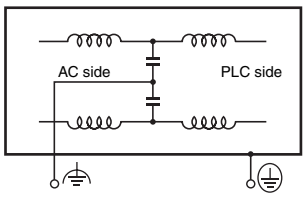
PLC Ground Terminals

The PLC has the following two ground terminals.

⏚ Protective ground terminal: Always connected to the PLC chassis to prevent electrical shock.

⏚ Functional ground terminal: Connected to a neutral point in the noise filter to provide a ground when power supply noise causes malfunctioning.

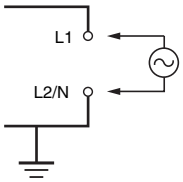
When the functional ground terminal is correctly grounded, it is generally effective in suppressing power supply common noise. Occasionally, however, grounding this terminal will result in picking up more noise, so be careful when using it.



PLC Ground Terminals

Grounding for AC Power Supply Units

When wiring to an AC Power Supply Unit, if one power supply phase of the equipment is grounded, always connect the grounded phase to the L2/N terminal.



6

Troubleshooting

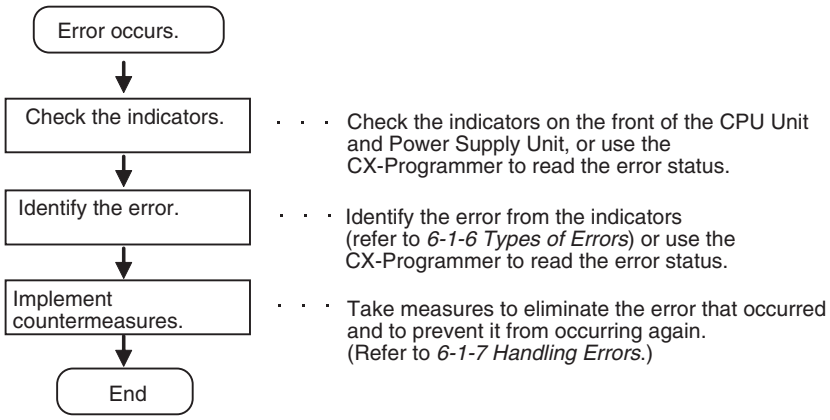
This section describes how to troubleshoot problems that may occur with a CJ2 PLC.

6-1 CPU Unit Errors 6-2
6-1-1 Errors and Remedies 6-2
6-1-2 Checking Errors 6-2
6-1-3 Checking Detailed Status 6-3
6-1-4 Reading Error Log Information 6-3
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6-1 CPU Unit Errors

6-1-1 Errors and Remedies

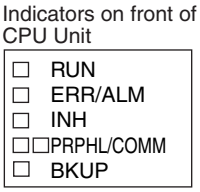
Use the following procedure when an error occurs.


Error occurs.
Check the indicators.
Identify the error.
Implement countermeasures.
End
Check the indicators on the front of the CPU Unit and Power Supply Unit, or use the CX-Programmer to read the error status.
Identify the error from the indicators (refer to 6-1-6 Types of Errors) or use the CX-Programmer to read the error status.
Take measures to eliminate the error that occurred and to prevent it from occurring again. (Refer to 6-1-7 Handling Errors.)

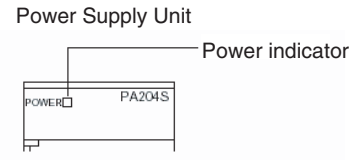
6-1-2 Checking Errors

The type of error that occurred can be determined by checking the indicators on the front of the CPU Unit or by using the CX-Programmer. For details on error types, refer to *6-1-6 Types of Errors*.

Checking the Indicators



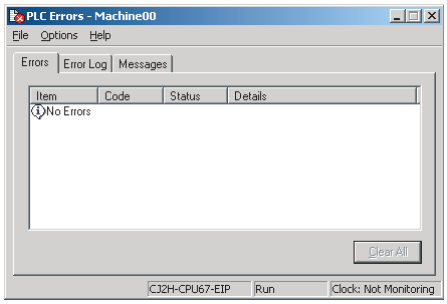
RUN:	Lit green when the PLC is in RUN or MONITOR mode.
ERR/ALM:	Shows the results of self-diagnosis. Flashing red: Non-fatal error Lit red: Fatal error
INH:	Lit yellow when Output OFF Bit has been turned ON.
PRPHL:	Flashing yellow when the CPU Unit is communicating through the peripheral port.
COMM:	Lit Flashing yellow when the CPU Unit is communicating through the RS-232C port.
BKUP:	Flashing yellow when data is being backed up from RAM to built-in flash memory.
POWER:	Lit when 5 V is output from the Power Supply Unit.



Checking Error Status with the CX-Programmer

Use the following procedure to read the error status.

1. Connect the CX-Programmer online.
2. Double-click *Error Log* in the project tree in the main window. The PLC Error Window will be displayed.
3. Click the **Errors** Tab. The current errors will be displayed on the Errors Tab Page.



6-1-3 Checking Detailed Status

You can check detailed error status using information registered in the Auxiliary Area. The following error details are registered.

- Error Flags: The Auxiliary Area contains flags that indicate the type of error. There are error flags for various types of error.
- Error Information: The Auxiliary Area contains words that provide detailed information on current errors. Error information is provided for various types of error.
- Error Code: The error code assigned to the current error is stored in word A400 regardless of the type of error. If two or more errors occur at the same time, the highest (most serious) error code will be stored in A400.

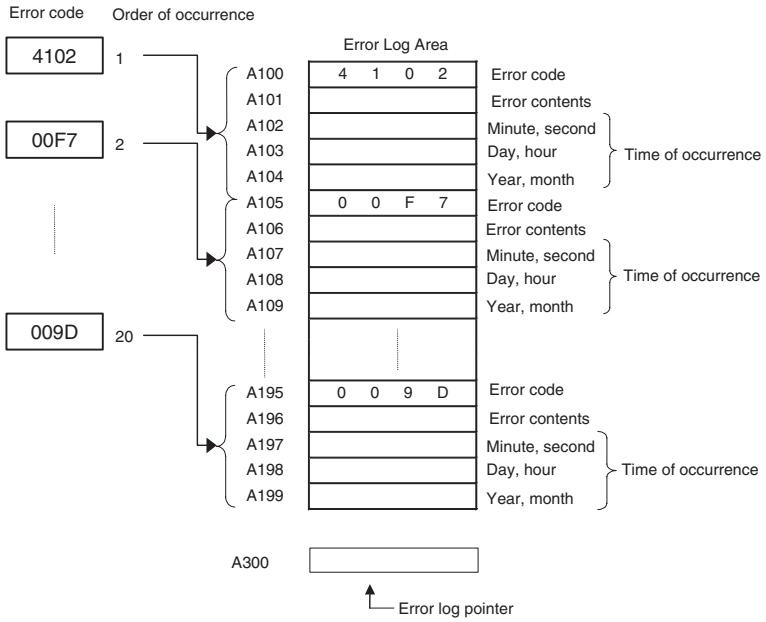
6-1-4 Reading Error Log Information

If the error status could not be checked when the error occurred, it can be checked by reading error log data. The following information is stored in the error log.

- Error code (This is the same error code as is stored in word A400.)
- Error information
- Time of occurrence

Error Log Information

A maximum of 20 error records will be stored in the error log. If more than 20 errors occur, the oldest error record (in A100 to A104) will be deleted and the 19 records stored in A105 to A199 will be shifted by one, with the newest record being stored in A195 to A199.

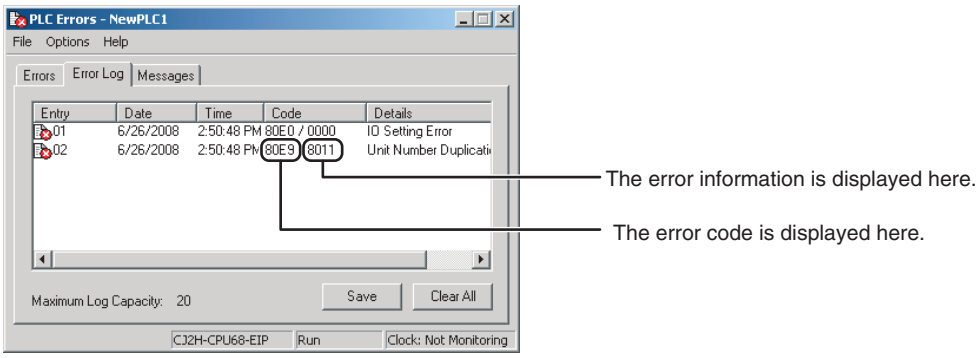


Checking Error Log Information

The following methods can be used to check error log information with the CX-Programmer.

● CX-Programmer PLC Error Window

Check the error log by clicking the **Error Log** Tab in the PLC Errors Window of the PLC.



The example above shows that unit number 17 has been duplicated for Special I/O Units.

- Error code 80E9: Unit number duplication error
- Error information: 80 "11": 11 hex = 17 decimal

For details on error codes and error information, refer to *A-3 Fatal and Non-fatal Error Details*.

● Directly Monitoring the Area where Error Log Information is Stored

1. Connect the CX-Programmer online.
2. Read words A100 to A199.
3. Check the error status from the registered data.

6-1-5 I/O Table Verification

When an I/O verification error or a CPU standby error occurs, the following procedure can be used to verify the I/O tables to locate where the error occurred. With the CX-Programmer, use the following procedure.

1. Double-click *I/O Tables* in the project tree in the main window.

   The I/O Table Window will be displayed.

2. Select ***Verify*** from the Options Menu in the I/O Table Window.

   The I/O table verification results will be displayed.

6-1-6 Types of Errors

The type of error that has occurred can be identified by checking the indicators on the front of the CPU Unit and the Power Supply Unit, or by using the CX-Programmer to check the error status. The errors detected by the CPU Unit are listed in the following table.

For details on errors that are not detected by the CPU Unit, refer to *6-3 Non-CPU Unit Errors and Remedies*.

Error name		POWER	RUN	ERR/ALM	INH	PRPHL	COMM	Error code (stored in A400)	Operation status
Power supply error		OFF	OFF	OFF	OFF	OFF	OFF	---	Operation stops.
CPU Standby		ON	OFF	OFF	---	---	---	---	Operation stops.
CPU reset								---	Operation stops.
CPU error (WDT error)*1		ON	OFF	ON	---	---	---	---	Operation stops.
USB port communications error		ON	ON	OFF	---	OFF	---	---	Operation continues.
RS-232C port communications error		ON	ON	OFF	---	---	OFF	---	Operation continues.
Fatal errors*1*2	Cycle time too long	ON	OFF	ON	---	---	---	0x809F	Operation stops.
	I/O bus error							0x80C0 to 0x80C7, 0x80CE, 0x80CF	
	I/O setting error							0x80E0	
	Too many I/O points							0x80E1	
	Duplicated number error							0x80E9, 0x80EA	
	Program error							0x80F0	
	Memory error							0x80F1	
	Version error							0x80F2	
	Memory Card error							0x80F4	
	FALS (007) error							0xC101 to 0xC2FF	
Non-fatal errors*2	Duplicate refreshing error	ON	ON	Flashing	---	---	---	0x008B	Operation continues.
	Basic I/O error							0x009A	
	PLC Setup setting error							0x009B	
	Backup memory error							0x00F1	
	Tag memory error							0x00F2	
	Other non-fatal errors (e.g., system work errors)							0x00F3	
	Battery error							0x00F7	
	CPU Bus Unit error							0x0200 to 0x020F	
	Special I/O Unit error							0x0300 to 0x035F, 0x03FF	
	CPU Bus Unit setting error							0x0400 to 0x040F	
	FAL (006) error							0x4101 to 0x42FF	
	Special I/O Unit setting error							0x0500 to 0x055F	

*1 The indicator status is the same for CPU errors and fatal errors, but they can be distinguished because a Programming Device can be connected when a fatal error occurs, but not when a CPU error occurs.

*2 For details on fatal errors and non-fatal errors, refer to *A-3 Fatal and Non-fatal Error Details*.

Note The indicator status shows the status of the errors that have occurred in RUN or MONITOR mode.

6-1-7 Handling Errors

This section describes the measures to take for the errors that most commonly occur. First check the error status. Then, make a preliminary determination of the cause of the error, confirm the cause, correct the error, and take measures to ensure that it will not occur again. For all other errors, refer to *A-3 Fatal and Non-fatal Error Details*.

Power Supply Errors

A power supply error occurs when a voltage of 5 V is not output from the Power Supply Unit.

POWER	RUN	ERR/ALM	CX-Programmer display	Error flag	Error code	Error information
Not lit.	Not lit.	Not lit.	----	None	None	None

Suspected cause of error	Confirmation method	Remedy	Prevention of recurrence
Power is not being input.	Use a tester to measure the voltage at the input terminals of the Power Supply Unit.*1	Turn the power ON again.	Investigate the reason that the power was turned OFF.
Connection status of power supply selector terminals	• 100 VAC: Use a tester check for short-circuits. • 200 VAC: Check for disconnections.	Reconnect and secure the terminal connections.	Periodically (approximately once a year) tighten the terminal connections.
The voltage is out of the allowable range for the power supply.	Use a tester to measure the voltage at the input terminals to the Power Supply Unit.*1	Correct the power supply system for the PLC.	Same as at the left.
Power Supply Unit failure	Replace the Power Supply Unit and check operation. (Check whether the POWER indicator is lit.)	Replace the Power Supply Unit.	Depends on the type of error.
Failure at another Unit	Remove in order the Units mounted in the Rack and check the POWER indicator.	Replace the failed Unit.	Depends on the type of error.

*1 The following table shows the allowable power supply ranges for each Power Supply Unit model.

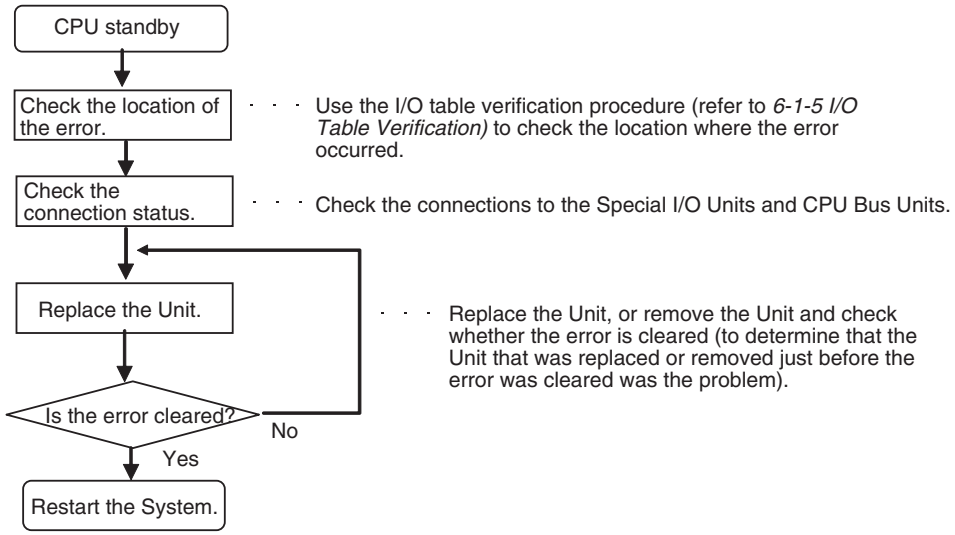
Model	Power supply voltage	Allowable power supply voltage fluctuation
CJ1W-PA205R/PA202	100 to 240 VAC	85 to 264 VAC
CJ1W-PD025	24 VDC	19.2 to 28.8 VDC

CPU Standby Errors

When a CJ-series PLC is turned ON, the CPU starts cyclic servicing and enters RUN mode only after all Special I/O Units and CPU Bus Units have been detected. If the startup mode is RUN or MONITOR mode, the CPU will remain on standby until all Units have been detected.

POWER	RUN	ERR/ALM	CX-Programmer display	Error flag	Error code	Error information
Lit.	Not lit.	Not lit.	Standby	None	None	None

● Recovery Processing Flow


CPU standby
Check the location of the error.
Use the I/O table verification procedure (refer to 6-1-5 I/O Table Verification) to check the location where the error occurred.
Check the connection status.
Check the connections to the Special I/O Units and CPU Bus Units.
Replace the Unit.
Replace the Unit, or remove the Unit and check whether the error is cleared (to determine that the Unit that was replaced or removed just before the error was cleared was the problem).
Is the error cleared?
No
Yes
Restart the System.

● Error Causes and Remedies

Suspected cause of error	Confirmation method	Remedy	Prevention of recurrence
Faulty connection at Unit (at a connector)	Check the insertion at the connector. Restart the Unit and check whether the error is cleared.	Tighten the screws.	Same as at the left.
Unit failure	Replace the Unit that is causing the standby (the undetected Unit). If the error is not cleared, remove the Units in order until the status returns to normal.	• Replace the Special I/O Unit or Interrupt Unit for which "$" is displayed when the I/O tables are read. • Replace the failed Unit.	(Determined by the cause of the failure.)
The remote I/O power supply is OFF or there is no terminator for SYSMAC BUS.	Check whether the power is turned ON. Check the terminator settings.	Turn ON the power or set the terminators. If the error is not cleared, replace the Unit.	---



Additional Information

The CJ2 CPU Units support a startup condition setting. To start the CPU Unit in RUN or MONITOR mode even if there is one or more Units that has not completed startup processing, select the *Start running program when initializing Unit/Inner board recognition* Check Box in the PLC Setup.

Name	Settings	Default
Start running program when initializing Unit/Inner board recognition	OFF: Wait for Units. ON: Don't wait.	OFF: Wait for Units.

CPU Reset

The CPU Unit is being reset, and Programming Devices cannot be connected.

POWER	RUN	ERR/ALM	CX-Programmer display	Error flag	Error code	Error information
Lit.	Not lit.	Not lit.	----	None	None	None

● Error Causes and Remedies

Suspected cause of error	Confirmation method	Remedy	Prevention of recurrence
Power to an Expansion Rack is OFF.	Use a tester to measure the voltage at the input terminals of the Power Supply Unit.*1	Turn ON the power.	Investigate the reason that the power was OFF.
The I/O Connecting Cable is incorrectly installed. • The IN-OUT connectors are reversed. • The cable does not have good contact at the connectors. • Two or more I/O Control Units are mounted on the CPU Rack, or an I/O Control Unit is mounted to an Expansion Rack.	Check the connections.	Reconnect the cable.	If the Cable is disconnected, check for vibration and shock.

*1 The following table shows the allowable power supply ranges for each Power Supply Unit.

Model	Power supply voltage	Allowable power supply voltage fluctuation
CJ1W-PA205R/PA202	100 to 240 VAC	85 to 264 VAC
CJ1W-PD025	24 VDC	19.2 to 28.8 VDC



Precautions for Correct Use

Observe the following points when using Expansion Racks.

- Always confirm the safety of any related equipment before turning the power supply ON or OFF.
- When the power supply is interrupted to an Expansion Rack, the CPU Unit will stop program execution and the same operations as are performed when the power supply to the CPU Unit is interrupted will be performed. For example, if the power OFF interrupt task is enabled, it will be executed. If power is then restored to the Expansion Rack, the CPU Unit will perform startup processing. The same operational status as existed before the power interrupt will not necessarily be continued.

CPU Errors

CPU errors are error that occur in the CPU Unit itself. A CPU error occurs when the WDT (watchdog timer) times out. Programming Devices cannot be connected when a CPU error occurs.

POWER	RUN	ERR/ALM	CX-Programmer display	Error flag	Error code	Error information
Lit.	Not lit.	Lit.	----	None	None	None

● Error Causes and Remedies

Suspected cause of error	Confirmation method	Remedy	Prevention of recurrence
Unit failure	A CPU error has possibly occurred in the following cases. • If the error is not cleared when the CPU Unit is restarted after the recovery measures. • If the error occurs frequently • If the condition improves when the Unit is replaced.	Replace the CPU Unit.	Same as at the left.
A conductive object has gotten inside.	Check for conductive objects.	Clean the inside of the Unit with an air blower or replace the CPU Unit.	Do not do any metal working in the vicinity of the control panel. Close the control panel.
Noise • The microcomputer inside the CPU Unit is malfunctioning.	When the CPU Unit is restarted after the recovery measures, the error will either be cleared or will continue to occur. Check whether errors become less frequent after the Unit is replaced.	Take measures against noise. (Investigate the path of entry.) • FG • Power lines	Same as at the left.

Precautions for Correct Use

- Always confirm the safety of any related equipment before turning the power supply ON or OFF.
- When power supply is interrupted to an Expansion Rack, the CPU Unit will stop program execution and the same operations as are performed when the power supply to the CPU Unit is interrupted will be performed. For example, if the power OFF interrupt task is enabled, it will be executed. If power is then restored to the Expansion Rack, the CPU Unit will perform startup processing. The same operational status as existed before the power interrupt will not necessarily be continued.

Communications Error (Peripheral (USB) Port)

A communications error will occur if there is an error in communications between the peripheral (USB) Port and a connected device.

POWER	RUN	ERR/ALM	PRPHL	COMM	CX-Programmer display	Error flag	Error code	Error information
Lit.	Lit.	Not lit.	Not lit.	Not lit.	----	None	None	None

● Error Causes and Remedies

Suspected cause of error	Confirmation method	Remedy	Prevention of recurrence
The communications cable is disconnected.	Perform a visual inspection and pull on the cables.	Reconnect the cables.	During operation, confirm that the connections are secure. Check for vibration or shock.

Communications Error (Serial Port (RS-232C))

A communications error will occur if there is an error in communications between the serial (RS-232C) port and a connected device.

POWER	RUN	ERR/ALM	PRPHL	COMM	CX-Programmer display	Error flag	Error code	Error information
Lit.	Lit.	Not lit.	Not lit.	Not lit.	----	None	None	None

● Error Causes and Remedies

Suspected cause of error	Confirmation method	Remedy	Prevention of recurrence
Communications settings are incorrect.	• Check whether the DIP switch pin 5 setting and and the serial port settings in the PLC Setup are correct. • If a host computer is connected, check the host computer serial port settings and the program.	• Correctly set DIP switch pin 5 and the serial port settings in the PLC Setup. • Correct the host computer serial port settings and the program.	Same as at the left.
A communications cable is incorrectly connected.	• Check the cable connections.	• Correct the cable connections.	Same as at the left.
A communications cable is disconnected.	Perform a visual inspection and pull on the cables.	Reconnect the cables.	During operation, confirm that the connections are secure. Check for effects of vibration or shock.

Cycle Time Too Long (Fatal Error)

● Cycle Time Too Long

A cycle time too long error will occur if the PLC cycle time exceeds the setting for Watch Cycle Time in the PLC Setup.

POWER	RUN	ERR/ALM	CX-Programmer display	Error flag	Error code	Error information
Lit.	Not lit.	Lit.	Cycle Time Error	A401.08	809F	None

● Error Causes and Remedies

Suspected cause of error	Confirmation method	Remedy	Prevention of recurrence
An interrupt task with a long processing time was executed.	Check the Max. Interrupt Task Processing Time (A440)	Divide the interrupt task into sections.	Same as at the left.
An incorrect value (an extremely large number) was set for the number of repeats of FOR(512).	Set up a trap in the ladder program to monitor the number of repeats.	Correct the ladder program.	Same as at the left.

● Peripheral Servicing Too Long

This error will occur if the peripheral servicing time exceeds 2.0 s.

POWER	RUN	ERR/ALM	CX-Programmer display	Error flag	Error code	Error information
Lit.	Not lit.	Lit.	Cycle Time Error	A405.15	809F	---

● Error Causes and Remedies

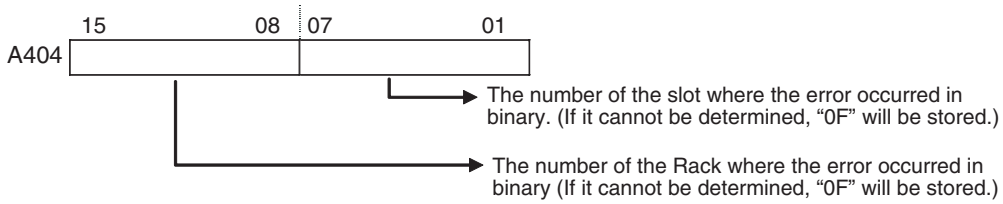
Suspected cause of error	Confirmation method	Remedy	Prevention of recurrence
The event load was too high.	---	Reduce the event load.	Same as at the left.

I/O Bus Error (Fatal Error)

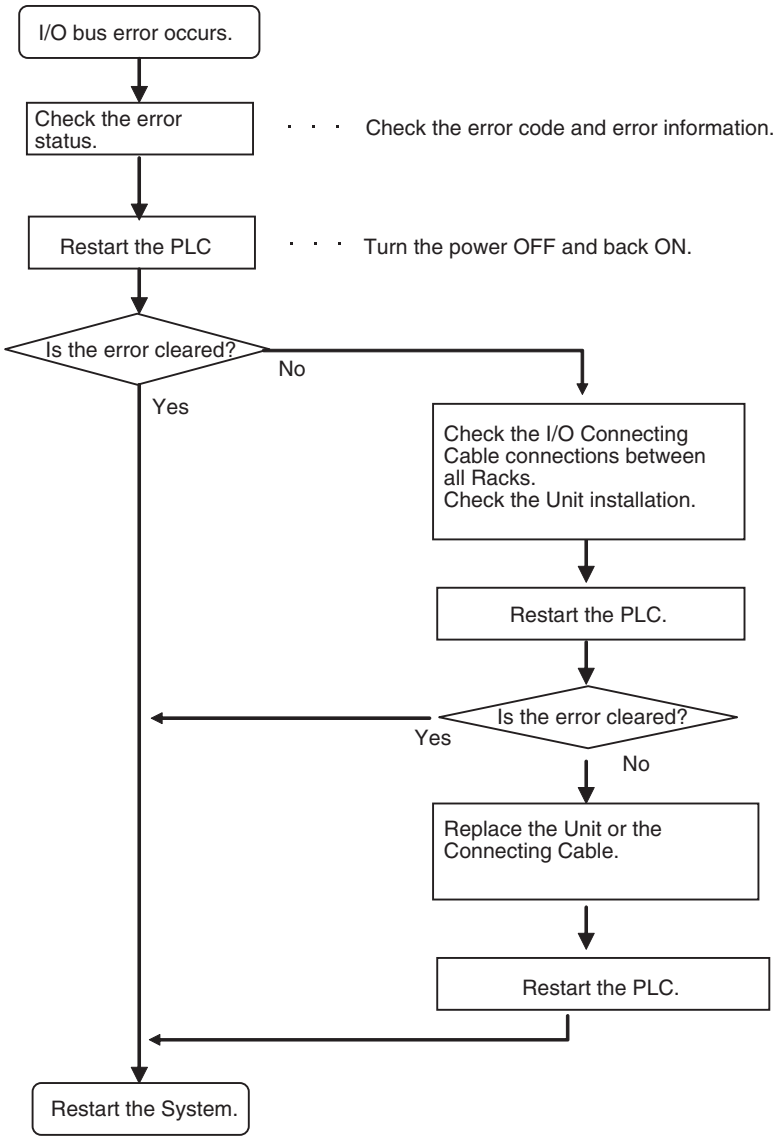
An I/O bus error will occur if there is an error in a data transfer between the CPU Unit and a Unit connected in the Rack.

POWER	RUN	ERR/ALM	CX-Programmer display	Error flag	Error code	Error information
Lit.	Not lit.	Lit.	I/O Bus Error	A401.14	80C0 to 80C7 or 80CF	A404*1

*1 The numbers of the slot and Rack where the I/O bus error was detected are stored in word A404.


15
08
07
01
A404
The number of the slot where the error occurred in binary. (If it cannot be determined, “0F” will be stored.)
The number of the Rack where the error occurred in binary (If it cannot be determined, “0F” will be stored.)

● Recovery Processing Flow



● Error Causes and Remedies

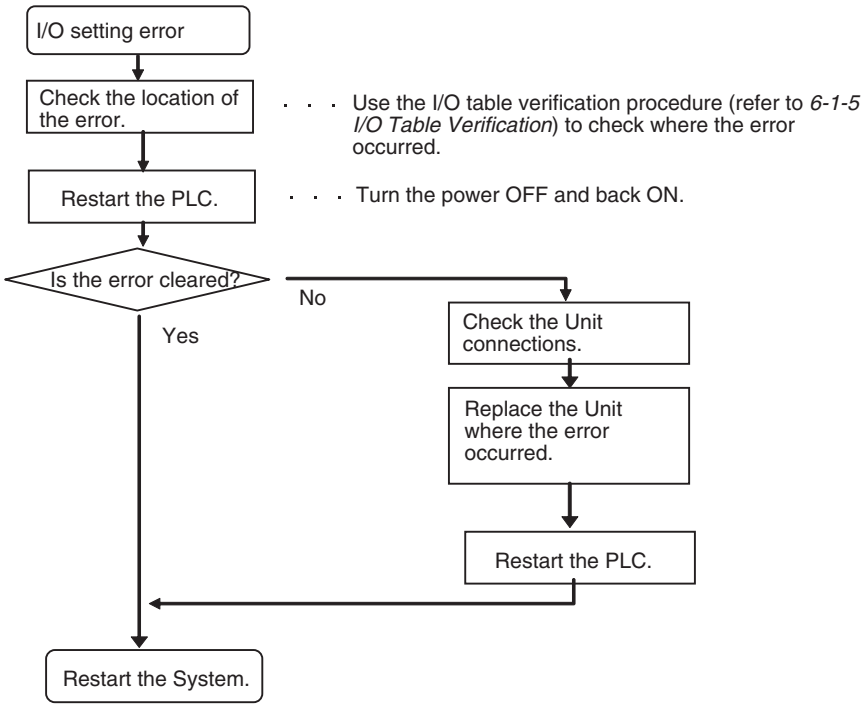
Suspected cause of error	Confirmation method	Remedy	Prevention of recurrence
The I/O Connecting Cable is disconnected.	Perform a visual inspection and pull on the Cables.	Reconnect the cables.	During operation, confirm that the connections are secure. Check for vibration or shock.
Equipment failure • CPU Unit • I/O Connecting Cable (damage to bus interface circuit)	An I/O bus error has possibly occurred in the following cases. • If the error is not cleared when the CPU Unit is restarted • If the error occurs frequently • If the condition improves when the Unit is replaced.	Replace the equipment. • CPU Unit • I/O Connecting Cable	---
A conductive object has gotten inside.	Check for conductive objects.	Clean the inside of the Unit with an air blower or replace the CPU Unit.	Do not do any metal working in the vicinity of the control panel. Close the control panel.
Faulty connector contact (A foreign object has gotten inside.)	Check for foreign objects in the connector.	Replace the Unit or take off the connector and remove the foreign object.	Make sure that the operating environment is free of dirt and dust.
Noise • Data corruption in bus signals • Malfunctioning in bus interface circuit	When the CPU Unit is restarted after the recovery measures, the error will either be cleared or will continue to occur. Check whether errors become less frequent after the Unit is replaced.	Take measures against noise. (Investigate the path of entry.) • FG • Power lines • I/O connecting cable (inductive noise)	Same as at the left.

I/O Setting Error (Fatal Error)

An I/O setting error will occur if the Units that are actually connected do not match the Unit in the registered I/O tables.

POWER	RUN	ERR/ALM	CX-Programmer display	Error flag	Error code	Error information
Lit.	Not lit.	Flashing.	I/O Setting Error	A402.09	80E0	---

● Recovery Processing Flow


I/O setting error
Check the location of the error.
. . . Use the I/O table verification procedure (refer to *6-1-5 I/O Table Verification*) to check where the error occurred.
Restart the PLC.
. . . Turn the power OFF and back ON.
Is the error cleared?
No
Yes
Check the Unit connections.
Replace the Unit where the error occurred.
Restart the PLC.
Restart the System.

● Error Causes and Remedies

Suspected cause of error	Confirmation method	Remedy	Prevention of recurrence
Faulty connection at Unit (at a connector)	Check the insertion at the connector. Restart the Unit and check whether the error is cleared.	Tighten the screws.	Same as at the left.
Unit failure	If restarting the Unit does not clear the error, check whether the error is cleared by replacing the Unit.	Replace the applicable Unit.	Same as at the left.
Noise • Data corruption in bus signals	Restart the CPU Unit and check whether the error continues to occur.	Take measures against noise. (Investigate the path of entry.) • FG • Power lines	Same as at the left.

Memory Error (Fatal Error)

A memory error will occur if there is a memory error in the CPU Unit or if a checksum error is detected (checksum checked by the PLC with each cycle). The details of the cause of the error will be stored in the error information in the Auxiliary Area.

POWER	RUN	ERR/ALM	CX-Programmer display	Error flag	Error code	Error information
Lit.	Not lit.	Lit.	Memory Error	A401.15	80F1	A403*1

*1 Individual bits in A403 indicate where the memory error occurred.

● Recovery Measures

Check the detailed error contents in the error information in the Auxiliary Area, and then implement the following recovery measures. If these measures cannot solve the problem, there is a strong probability that the Unit has failed, so replace the Unit.

Error information	Error contents	Recovery measures
A403.00: ON	A checksum error has occurred in the user program memory.	Transfer the user program to the CPU Unit again.
A403.04: ON	A checksum error has occurred in the PLC Setup.	Transfer the PLC Setup to the CPU Unit again.
A403.05: ON	A checksum error has occurred in the registered I/O table.	Transfer the I/O tables to the CPU Unit again.
A403.07: ON	A checksum error has occurred in the routing tables.	Transfer the routing tables to the CPU Unit again.
A403.08: ON	A checksum error has occurred in the CPU Bus Unit setup.	Transfer the CPU Bus Unit setup again.
A403.09: ON	An error occurred during automatic transfer from the Memory Card at startup.	The following files are required for automatic transfer at startup. Save these files to the Memory Card and restart. • Program file: AUTOEXEC.OBJ • Parameters file: AUTOEXEC.STD
A403.10: ON	An error occurred in flash memory (backup memory).	Replace the CPU Unit (hardware failure).



Additional Information

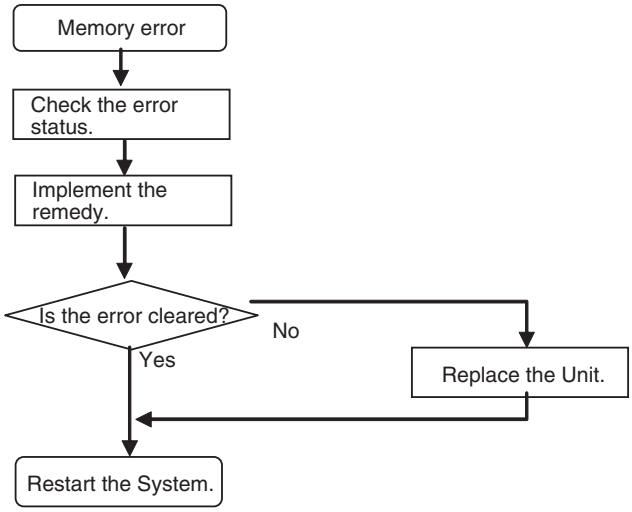
Checksums are used to detect illegal rewriting in a specific area of memory by calculating and comparing sums written to memory in advance to sums during operation. When a checksum error is detected by the CJ2 CPU Unit during operation, memory is automatically recovered by automatically reading data from flash memory. If recovery is not possible, an error occurs and operation stops.

Use any of the following methods to transfer the data again.

- Use the CX-Programmer to download data.
- Use the automatic transfer at startup function to download data saved on a Memory Card.
- Use the simple backup function to download data saved on a Memory Card.

The CJ2 CPU Unit has built-in flash memory for backup. When the CPU Unit is restarted, data is transferred to memory for calculation and this sometimes enables an error to be cleared.

● Recovery Processing Flow



● Error Causes and Remedies

If the measures described above do not clear the error, take the measures shown in the following table.

Suspected cause of error	Confirmation method	Remedy	Prevention of recurrence
Unit failure • Memory element failure • Memory peripheral circuit failure	A memory error has probably occurred in the following cases. • If the error is not cleared when the CPU Unit is restarted after the recovery measures • If the error occurs frequently • If the condition improves when the Unit is replaced.	Replace the CPU Unit.	Determined by the cause of the failure.
A conductive object has gotten inside.	Check for conductive objects.	Clean the inside of the Unit with an air blower or replace the CPU Unit.	Do not do any metal working in the vicinity of the control panel. Close the control panel.
Noise • Data corruption in memory • Microcomputer malfunctioning • Memory write circuit malfunctioning	When the CPU Unit is restarted after the recovery measures, the error will either be cleared or will continue to occur. Check whether errors become less frequent after the Unit is replaced.	Take measures against noise. (Investigate the path of entry.) • FG • Power lines	Same as at the left.
Software error*1	None	None	None

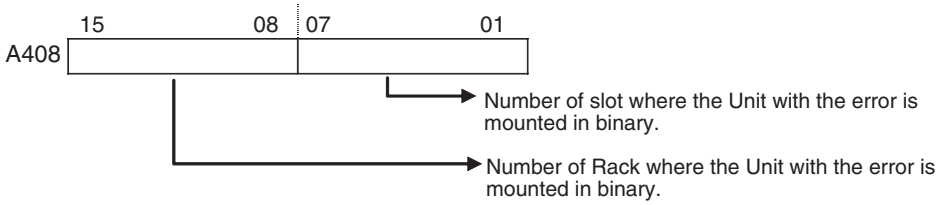
*1 This refers to errors caused by data corruption. SRAM is used for the CPU Unit user memory. SRAM is affected by cosmic rays (neutrons), so data can become corrupted.

Basic I/O Error (Non-fatal Error)

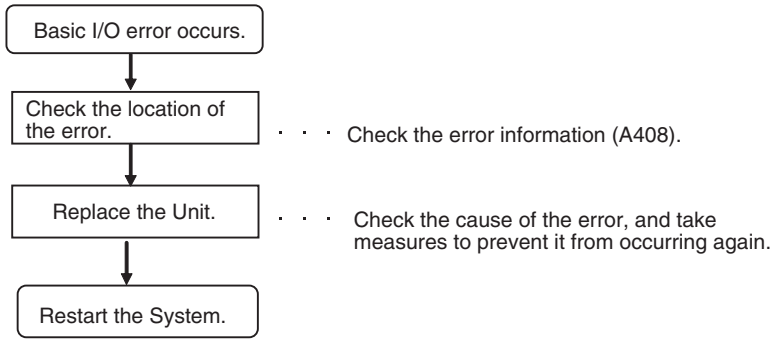
A basic I/O error occurs when there is an error at a Basic I/O Unit.

POWER	RUN	ERR/ALM	CX-Programmer display	Error flag	Error code	Error information
Lit.	Not lit.	Flashing.	Density IO Error	A402.12	009A	A408*1

*1 Error Information


15
08
07
01
A408
Number of slot where the Unit with the error is mounted in binary.
Number of Rack where the Unit with the error is mounted in binary.

● Recovery Processing Flow


Basic I/O error occurs.
Check the location of the error.
Check the error information (A408).
Replace the Unit.
Check the cause of the error, and take measures to prevent it from occurring again.
Restart the System.

● Error Causes and Remedies

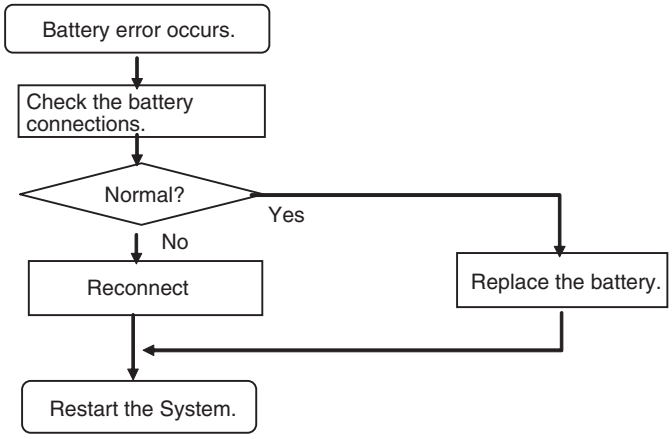
Suspected cause of error	Confirmation method	Remedy	Prevention of recurrence
A fuse is burned out.	Measure the voltage at the power supply terminals. Check whether 24 V is being supplied. (Check whether the problem is solved by replacing the fuse.)	Replace the fuse.	Check the maximum switching current.
The external power supply is OFF (disconnected).	Measure the voltage at the power supply terminals. Check whether 24 V is being supplied.	Turn ON the power supply.	Investigate the reason that the power was turned OFF.
Other errors specific to Units	Refer to the manual for the particular Unit.	Same as at the left.	Same as at the left.

Battery Error (Non-fatal Error)

A battery error occurs when the battery voltage drops.

POWER	RUN	ERR/ALM	CX-Programmer display	Error flag	Error code	Error information
Lit.	Not lit.	Flashing.	Battery Error	A402.04	00F7	---

● Recovery Processing Flow



● Error Causes and Remedies

Suspected cause of error	Confirmation method	Remedy	Prevention of recurrence
A connector is disconnected.	Check the connection at the connector.	Reconnect the connector.	Check for vibration and shock.
Battery voltage is low.	Check whether the error is cleared by replacing the battery.	Replace the battery.	Periodically replace the battery.

CPU Bus Unit Error (Non-fatal Error)

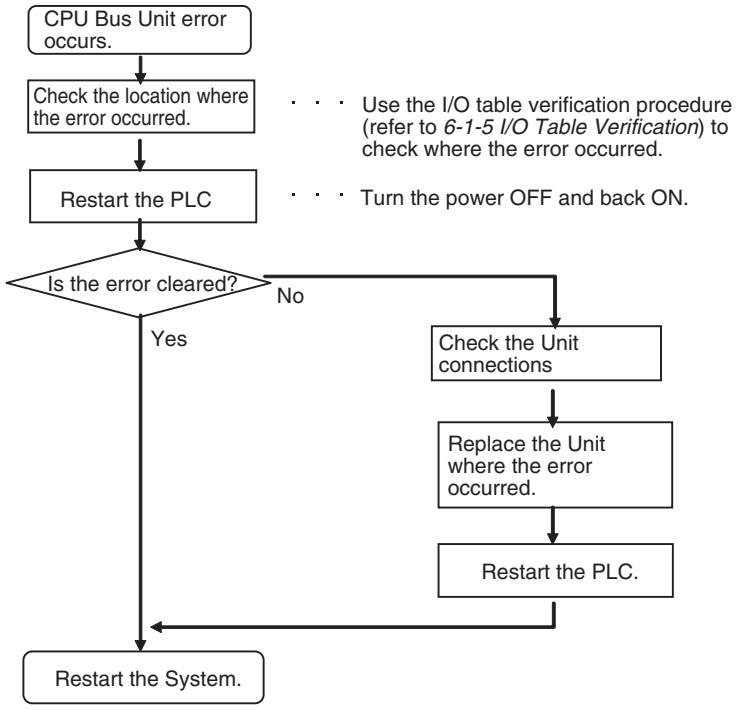
A CPU Bus Unit error occurs when there is an error in the data conversion between the CPU Unit and a CPU Bus Unit.

POWER	RUN	ERR/ALM	CX-Programmer display	Error flag	Error code	Error information
Lit.	Not lit.	Flashing.	CPU Bus Unit Error XX*1	A402.07	0200 to 020F	A417*2

*1 The exes (XX) indicate the unit number where the error occurred.

*2 The bit corresponding to the unit number where the error occurred turns ON. (Bits 00 to 15 correspond to unit numbers 0 to F.)

● Recovery Processing Flow


CPU Bus Unit error occurs.
Check the location where the error occurred.
Use the I/O table verification procedure (refer to *6-1-5 I/O Table Verification*) to check where the error occurred.
Restart the PLC
Turn the power OFF and back ON.
Is the error cleared?
No
Yes
Check the Unit connections
Replace the Unit where the error occurred.
Restart the PLC.
Restart the System.

● Error Causes and Remedies

Suspected cause of error	Confirmation method	Remedy	Prevention of recurrence
An error specific to the Unit	Refer to the manual for the particular Unit.	Same as at the left.	Same as at the left.
Faulty connection at Unit (at a connector)	Check the insertion at the connector. Restart the Unit and check whether the error is cleared.	Tighten the screws.	Check for vibration and shock.
Unit failure	If restarting the Unit does not clear the error, check whether the error is cleared by replacing the Unit.	Replace the applicable Unit.	Same as at the left.
Noise • Data corruption in bus signals	Restart the CPU Unit and check whether the error occurs again.	Take measures against noise. (Investigate the path of entry.) • FG • Power lines	Same as at the left.

Special I/O Unit Error (Non-fatal Error)

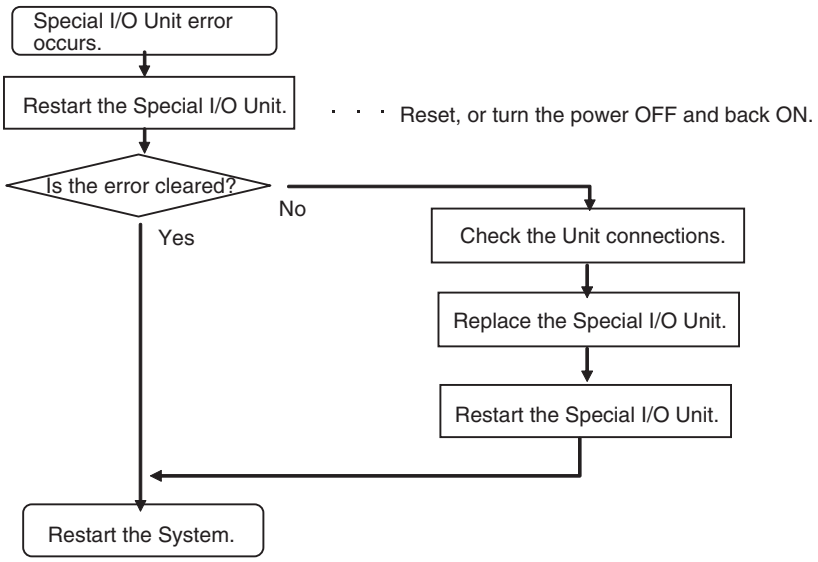
A Special I/O Unit error occurs when there is an error in the data conversion between the CPU Unit and a Special I/O Unit.

POWER	RUN	ERR/ALM	CX-Programmer display	Error flag	Error code	Error information
Lit.	Not lit.	Flashing.	Special IO Unit Error XX *1	A402.06	0300 to 035F or 03FF	A418 to A423 *2

*1 The exes (XX) indicate the unit number where the error occurred.

*2 The bit corresponding to the unit number where the error occurred turns ON.

● Recovery Processing Flow


Special I/O Unit error occurs.
Restart the Special I/O Unit.
Reset, or turn the power OFF and back ON.
Is the error cleared?
No
Yes
Check the Unit connections.
Replace the Special I/O Unit.
Restart the Special I/O Unit.
Restart the System.

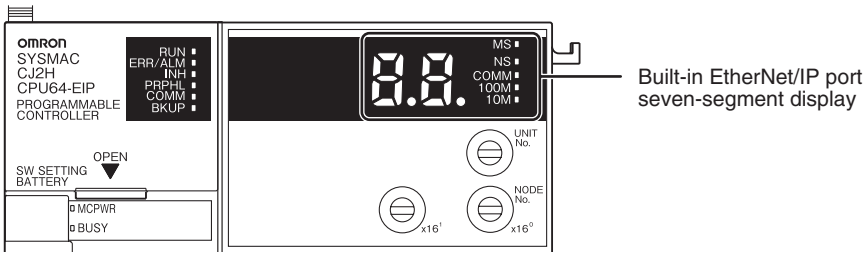
● Error Causes and Remedies

Suspected cause of error	Confirmation method	Remedy	Prevention of recurrence
An error specific to the Unit	Refer to the manual for the particular Unit.	Same as at the left.	Same as at the left.
Faulty connection at Unit (at a connector)	Check the insertion at the connector. Restart the Unit and check whether the error is cleared.	Tighten the screws.	Check for vibration and shock.
Unit failure	If restarting the Unit does not clear the error, check whether the error is cleared by replacing the Unit.	Replace the applicable Unit.	Same as at the left.
Noise • Data corruption in bus signals	Restart the CPU Unit and check whether the error occurs again after this.	Take measures against noise. (Investigate the path of entry.) • FG • Power lines	Same as at the left.

6-2 Built-in EtherNet/IP Port Errors and Remedies

6-2-1 Checking Built-in EtherNet/IP Port Error Status

Built-in EtherNet/IP port errors can be checked on the built-in EtherNet/IP port seven-segment display on the front of the CPU Unit.



Precautions for Correct Use

- For details on the types of errors related to the built-in EtherNet/IP port, and measures for handling them, refer to the *CS/CJ Series EtherNet/IP Units Operation Manual* (Cat. No. W465).

6-2-2 Checking Error Status at the EtherNet/IP Port Seven-segment Display

Built-in EtherNet/IP port seven-segment display



The seven-segment display alternately displays the built-in EtherNet/IP port node address and the following error codes.

● Normal Operation

Indications			Error
MS	NS	7-segment	
Lit green	Lit or flashing green	Built-in EtherNet/IP port node address	Normal

● Errors Related to CPU Unit Data Exchange

Indications			Error
MS	NS	7-segment	
Flashing red	Not lit	H1	Duplicate unit number
Flashing red	Not lit	H2	CPU Unit faulty
Lit red	Not lit	H3	Built-in EtherNet/IP port faulty
Flashing red	Not lit	H4	Node address setting error
Flashing red	Not lit	H6	CPU Unit faulty
Flashing red	Not lit	H7	I/O table not registered
Flashing red	---	H8	Simple backup function restore error
Flashing red	---	H9	I/O bus error
Flashing red	---	HA	CPU Unit memory error
Flashing red	Not lit	Hb	CPU Unit event servicing timeout
Flashing red	---	HC	Routing table error
Flashing red	---	Hd	I/O refresh error
Flashing red	---	HE	CPU Unit service monitoring error
Flashing red	---	HF	CPU Unit watchdog timer error

● Errors Related to the CPU Unit

Indications			Error
MS	NS	7-segment	
Flashing red	---	HH	CPU Unit Fatal Error
---	---	---	Output OFF Error

● Errors Related to the Control Bits

Indications			Error
MS	NS	7-segment	
---	---	C6	Multiple Switches ON

● Errors Related to the Tag Data Links

Indications			Error
MS	NS	7-segment	
---	---	d5	Verification Error (target non-existent)
---	---	d6	Connection Failed
---	---	d9	Tag Data Link Error

● Errors Related to Memory Access

Indications			Error
MS	NS	7-segment	
Flashing red	---	E9	Memory Access Error
Flashing red	---	E8	Device Parameters Error
Flashing red	---	EA	IP Advanced Settings Error
Flashing red	---	F2	Ethernet Basic Settings Error

● Errors Related to the Network

Indications			Error
MS	NS	7-segment	
---	---	E1	Ethernet Link Not Detected
---	---	E3	Server Connection Error
---	Lit red	F0	IP Address Duplication
Flashing red	---	F3	Address mismatch
Flashing red	Not lit	F4	Communications Controller Error
Flashing red	---	C8	Node Address Setting Changed During Operation

● Errors Related to Board

Indicator			Error
MS	NS	7-segment	
Lit red	Not lit	---	CPU Bus Unit Error

6-3 Non-CPU Unit Errors and Remedies

6-3-1 Error Causes and Remedies

Input Units

No.	Symptom	Cause	Remedy
1	Not all inputs turn ON or indicators are not lit.	Power is not supplied to Input Unit.	Supply the appropriate external input power.
		Supply voltage is low.	Adjust supply voltage to within rated range.
		Terminal block mounting screws are loose.	Tighten screws.
		Faulty contact of terminal block connector.	Replace terminal block connector.
2	Not all inputs turn ON (indicator lit).	Input circuit is faulty.	Replace Unit.
3	Not all inputs turn OFF.	Input circuit is faulty.	Replace Unit.
4	Specific bit does not turn ON.	Input device is faulty.	Replace input devices.
		Input wiring disconnected.	Check input wiring
		Terminal block screws are loose.	Tighten screws.
		Faulty terminal block connector contact.	Replace terminal block connector.
		Too short ON time of external input.	Adjust input device.
		Faulty input circuit	Replace Unit.
		Input bit number is used for output instruction.	Correct program.
5	Specific bit does not turn OFF.	Input circuit is faulty.	Replace Unit.
		Input bit number is used for output instruction.	Correct program.
6	Input irregularly turns ON/OFF.	External input voltage is low or unstable.	Adjust external input voltage to within rated range.
		Malfunction due to noise.	Take protective measures against noise, such as: • Install surge suppressor. • Install insulation transformer. • Install shielded cables between the Input Unit and the loads.
		Terminal block screws are loose.	Tighten screws.
		Faulty terminal block connector contact.	Replace terminal block connector.

No.	Symptom	Cause	Remedy
7	Error occurs in units of 8 points or 16 points, i.e., for the same common.	Common terminal screws are loose.	Tighten screws.
		Faulty terminal block connector contact.	Replace terminal block connector.
		Faulty data bus	Replace Unit.
		Faulty CPU	Replace CPU.
8	Input indicator is not lit in normal operation.	Faulty indicator or indicator circuit.	Replace Unit.

Output Units

No.	Symptom	Cause	Remedy
1	Not all outputs turn ON.	Load is not supplied with power.	Supply power.
		Load voltage is low.	Adjust voltage to within rated range.
		Terminal block screws are loose.	Tighten screws.
		Faulty terminal block connector contact.	Replace terminal block connector.
		An overcurrent (possibly caused by a short at the load) resulted in a blown fuse in the Output Unit. (Some Output Units provide an indicator for blown fuses.)	Replace fuse.
		Faulty I/O bus connector contact.	Replace Unit.
		Output circuit is faulty.	Replace Unit.
		If the INH indicator is lit, the Output OFF Bit (A500.15) is ON.	Turn A500.15 OFF.
2	Not all outputs turn OFF.	Output circuit is faulty.	Replace Unit.
3	Output of a specific bit number does not turn ON or indicator is not lit.	Output ON time too short because of a mistake in programming.	Correct program to increase the time that the output is ON.
		Bit status controlled by multiple instructions.	Correct program so that each output bit is controlled by only one instruction.
		Faulty output circuit.	Replace Unit.
4	Output of a specific bit number does not turn ON (indicator lit).	Faulty output device.	Replace output device.
		Break in output wiring.	Check output wiring.
		Loose terminal block screws.	Tighten screws.
		Faulty terminal block connector contact.	Replace terminal block connector.
		Faulty output bit on a Relay Output Unit.	Replace relay.
		Faulty output circuit.	Replace Unit.
5	Output of a specific bit number does not turn OFF (indicator is not lit).	Faulty output bit (Relay Output Units only)	Replace relay.
		Bit does not turn OFF due to leakage current or residual voltage.	Replace external load or add dummy resistor.
6	Output of a specific bit number does not turn OFF (indicator lit).	Bit status controlled by multiple instructions.	Correct program.
		Faulty output circuit.	Replace Unit.

No.	Symptom	Cause	Remedy
7	Output irregularly turns ON/OFF.	Low or unstable load voltage.	Adjust load voltage to within rated range.
		Bit status controlled by multiple instructions.	Correct program so that each output bit is controlled by only one instruction.
		Malfunction due to noise.	Protective measures against noise: • Install surge suppressor. • Install insulation transformer. • Use shielded cables between the Output Unit and the loads.
		Terminal block screws are loose.	Tighten screws.
		Faulty terminal block connector contact.	Replace terminal block connector.
8	Error occurs in units of 8 points or 16 points, i.e., for the same common.	Loose common terminal screw.	Tighten screws.
		Faulty terminal block connector contact.	Replace terminal block connector.
		An overcurrent (possibly caused by a short at the load) resulted in a blown fuse in the Output Unit.	Replace fuse.
		Faulty data bus.	Replace Unit.
		Faulty CPU.	Replace CPU.
9	Output indicator is not lit (operation is normal).	Faulty indicator.	Replace Unit.
10	ERR indicator (load short-circuit alarm) lights and outputs turn OFF.	An external short-circuit or disconnection occurred.	Refer to *A-6-1 Load Short-circuit Protection and Line Disconnection Detection for CJ1W-OD202*.

● Special I/O Units

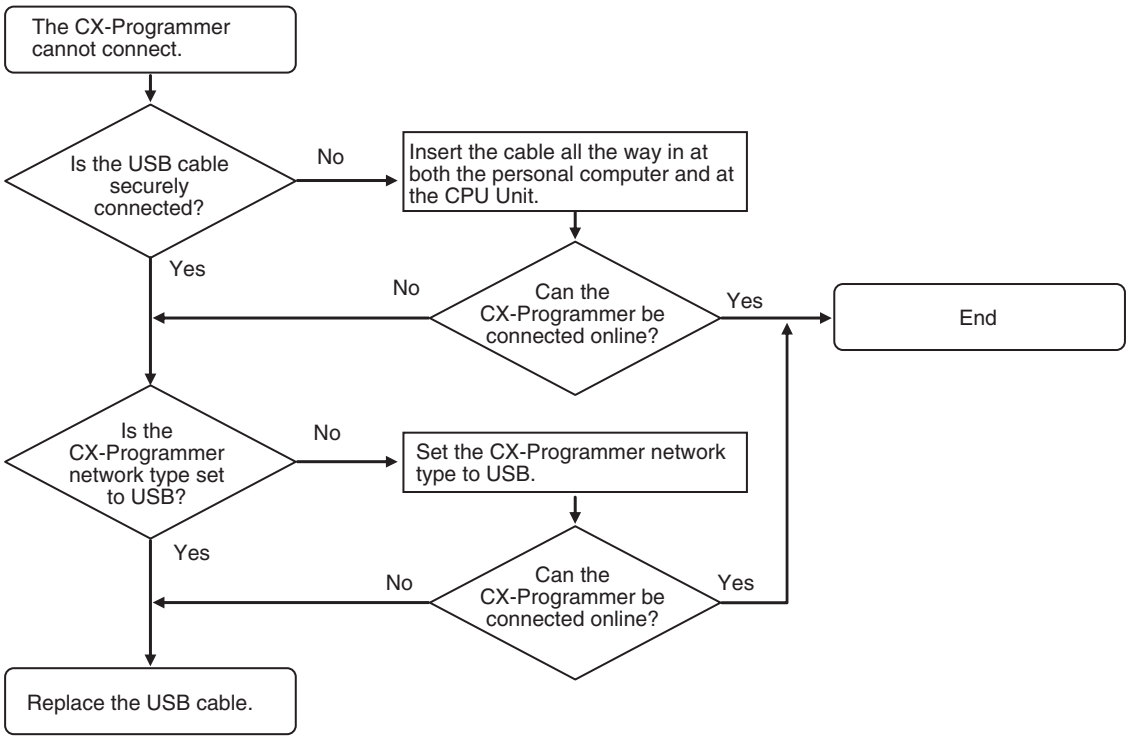
Refer to the *Operation Manual* for the Special I/O Unit to troubleshoot any other errors.

No.	Symptom	Cause	Remedy
1	The ERH and RUN indicators on the Special I/O Unit are lit.	Special I/O refreshing is not being performed for the Unit from the CPU Unit (CPU Unit monitoring error).	Change the bit corresponding to the unit number to 0 to enable cyclic refreshing, or make sure that the Unit is refreshed from the program using IORF or FIORF at least once every 11 s.

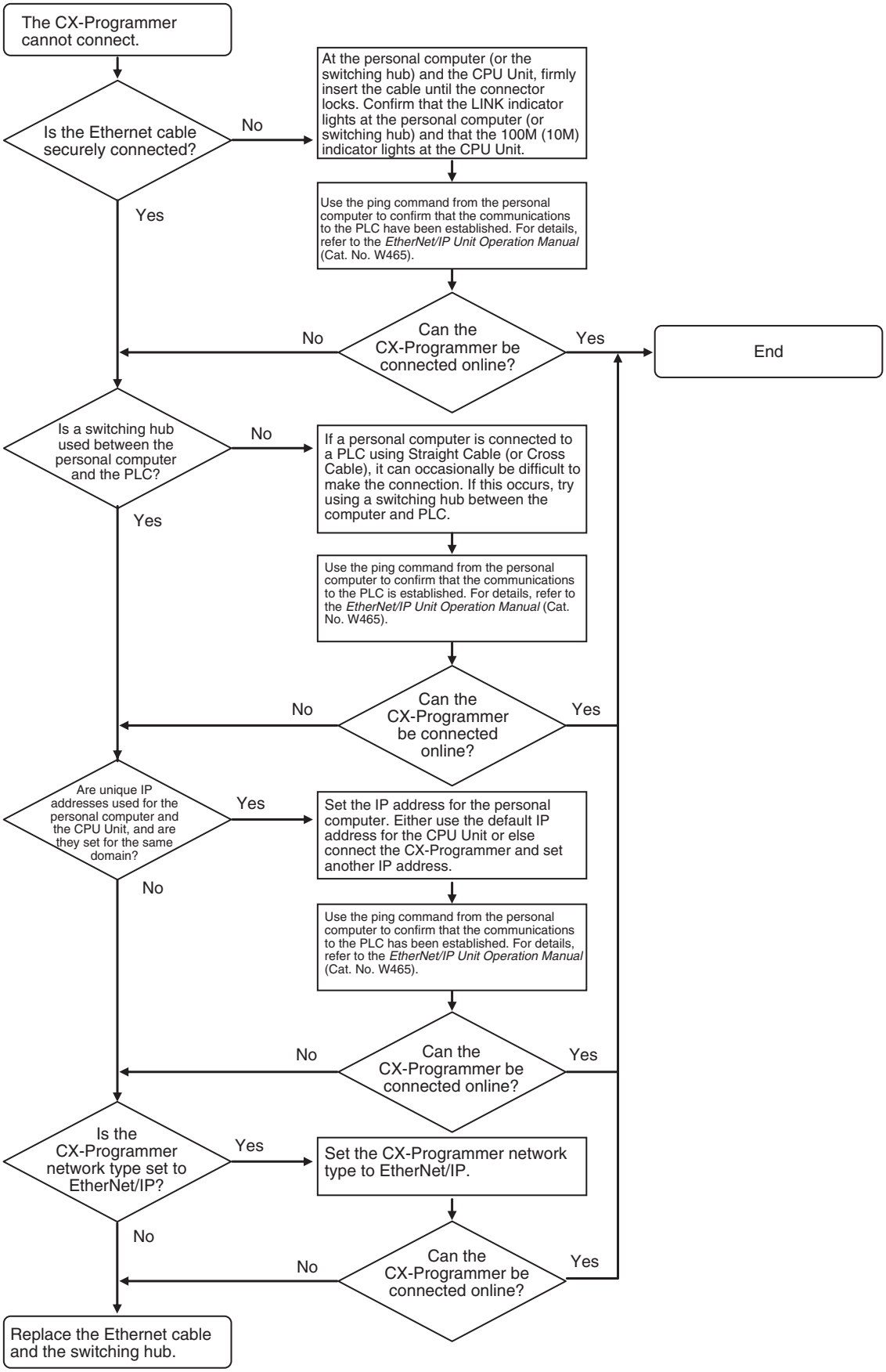
CX-Programmer Connections

Use the following procedure if the CX-Programmer cannot be connected.

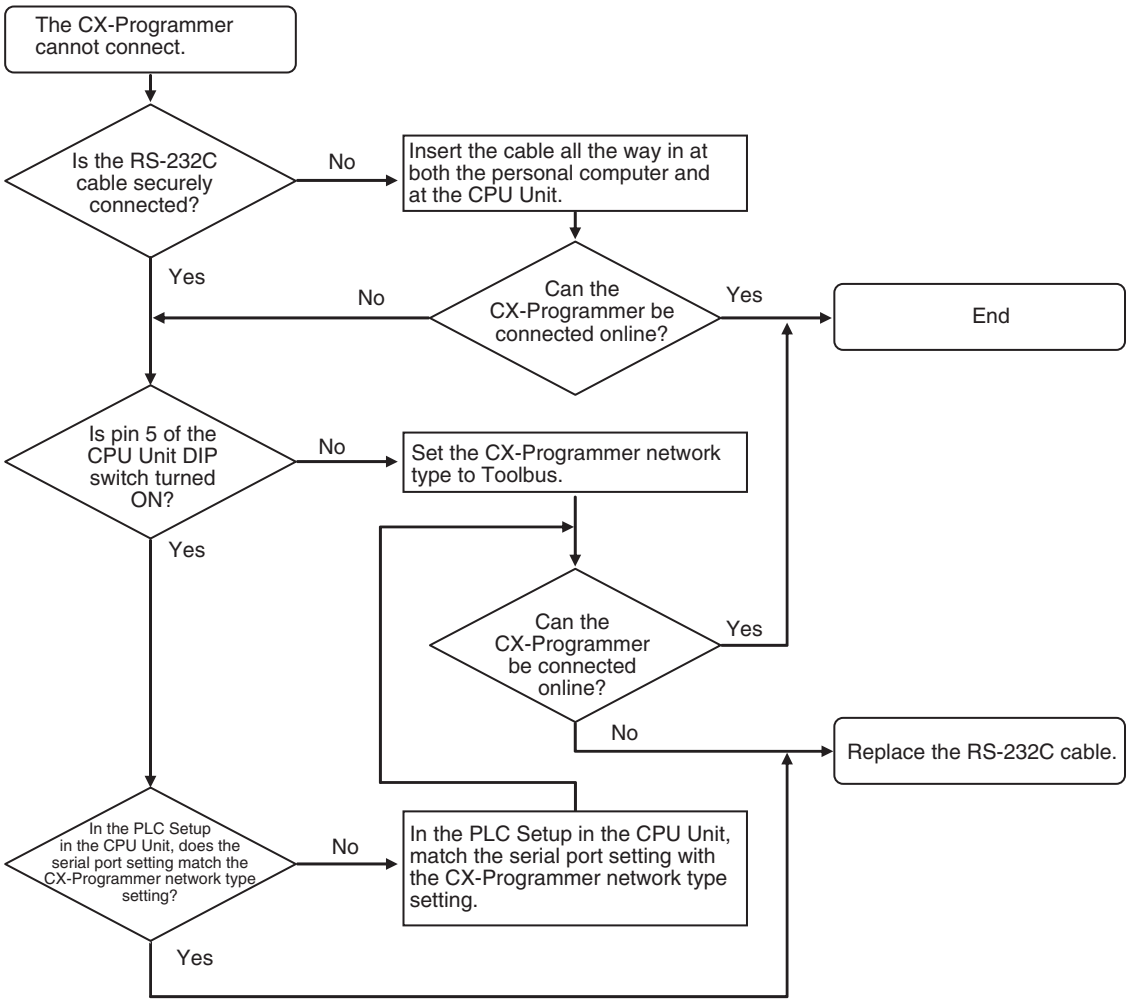
● Connecting via the Peripheral Port (USB)



● Connecting via the EtherNet/IP port


The CX-Programmer cannot connect.
Is the Ethernet cable securely connected?
No
At the personal computer (or the switching hub) and the CPU Unit, firmly insert the cable until the connector locks. Confirm that the LINK indicator lights at the personal computer (or switching hub) and that the 100M (10M) indicator lights at the CPU Unit.
Yes
Use the ping command from the personal computer to confirm that the communications to the PLC have been established. For details, refer to the EtherNet/IP Unit Operation Manual (Cat. No. W465).
Can the CX-Programmer be connected online?
No
Yes
End
Is a switching hub used between the personal computer and the PLC?
No
If a personal computer is connected to a PLC using Straight Cable (or Cross Cable), it can occasionally be difficult to make the connection. If this occurs, try using a switching hub between the computer and PLC.
Yes
Use the ping command from the personal computer to confirm that the communications to the PLC is established. For details, refer to the EtherNet/IP Unit Operation Manual (Cat. No. W465).
Can the CX-Programmer be connected online?
No
Yes
Are unique IP addresses used for the personal computer and the CPU Unit, and are they set for the same domain?
Yes
Set the IP address for the personal computer. Either use the default IP address for the CPU Unit or else connect the CX-Programmer and set another IP address.
No
Use the ping command from the personal computer to confirm that the communications to the PLC has been established. For details, refer to the EtherNet/IP Unit Operation Manual (Cat. No. W465).
Can the CX-Programmer be connected online?
No
Yes
Is the CX-Programmer network type set to EtherNet/IP?
Yes
Set the CX-Programmer network type to EtherNet/IP.
No
Can the CX-Programmer be connected online?
No
Yes
Replace the Ethernet cable and the switching hub.

● Connecting via the Serial Port


The CX-Programmer cannot connect.
Is the RS-232C cable securely connected?
No
Insert the cable all the way in at both the personal computer and at the CPU Unit.
Yes
No
Can the CX-Programmer be connected online?
Yes
End
Is pin 5 of the CPU Unit DIP switch turned ON?
No
Set the CX-Programmer network type to Toolbus.
Yes
Can the CX-Programmer be connected online?
Yes
No
Replace the RS-232C cable.
In the PLC Setup in the CPU Unit, does the serial port setting match the CX-Programmer network type setting?
No
In the PLC Setup in the CPU Unit, match the serial port setting with the CX-Programmer network type setting.
Yes

7

Inspection and Maintenance

This section describes the inspection and maintenance that is required for CJ2 PLCs.

7-1 Inspections 7-2
7-1-1 Inspection Points 7-2
7-1-2 Unit Replacement Precautions 7-4
7-2 Replacing the Battery 7-5
7-2-1 Battery Replacement 7-5
7-2-2 Operation When Battery Is Exhausted or Not Installed 7-8
7-3 Power Supply Unit Replacement Time 7-10

7-1 Inspections

Daily or periodic inspections are required in order to maintain the PLC's functions in peak operating condition.

7-1-1 Inspection Points

Although the major components in CJ-series PLCs have an extremely long life time, they can deteriorate under improper environmental conditions. Periodic inspections are thus required to ensure that the required conditions are being kept.

Inspection is recommended at least once every six months to a year, but more frequent inspections will be necessary in adverse environments.

Take immediate steps to correct the situation if any of the conditions in the following table are not met.

Periodic Inspection Points

No.	Item	Inspection	Criteria	Action
1	Source Power Supply	Check for voltage fluctuations at the power supply terminals.	The voltage must be within the allowable voltage fluctuation range.	Use a voltage tester to check the power supply at the terminals. Take necessary steps to bring voltage fluctuations within limits.
2	I/O Power Supply	Check for voltage fluctuations at the I/O terminals.	Voltages must be within specifications for each Unit.	Use a voltage tester to check the power supply at the terminals. Take necessary steps to bring voltage fluctuations within limits.
3	Ambient environment	Check the ambient temperature. (Inside the control panel if the PLC is in a control panel.)	0 to 55°C	Use a thermometer to check the temperature and ensure that the ambient temperature remains within the allowed range of 0 to 55°C.
		Check the ambient humidity. (Inside the control panel if the PLC is in a control panel.)	Relative humidity must be 10% to 90% with no condensation.	Use a hygrometer to check the humidity and ensure that the ambient humidity remains between 10% and 90%. Make sure that condensation does not occur due to rapid changes in temperature.
		Check that the PLC is not in direct sunlight.	Not in direct sunlight	Protect the PLC if necessary.
		Check for accumulation of dirt, dust, salt, metal filings, etc.	No accumulation	Clean and protect the PLC if necessary.
		Check for water, oil, or chemical sprays hitting the PLC.	No spray on the PLC	Clean and protect the PLC if necessary.
		Check for corrosive or flammable gases in the area of the PLC.	No corrosive or flammable gases	Check by smell or use a sensor.
		Check the level of vibration or shock.	Vibration and shock must be within specifications.	Install cushioning or shock absorbing equipment if necessary.
		Check for noise sources near the PLC.	No significant noise sources	Either separate the PLC and noise source or protect the PLC.

No.	Item	Inspection	Criteria	Action
4	Installation and wiring	Check that each Unit is connected and locked to the next Unit securely.	No looseness	Press the connectors together completely and lock them with the sliders.
		Check that cable connectors are fully inserted and locked.	No looseness	Correct any improperly installed connectors.
		Check for loose screws in external wiring.	No looseness	Tighten loose screws with a Phillips-head screwdriver.
		Check crimp connectors in external wiring.	Adequate spacing between connectors	Check visually and adjust if necessary.
		Check for damaged external wiring cables.	No damage	Check visually and replace cables if necessary.
5	User-serviceable parts	Check whether the battery has reached its service life. CJ1W-BAT01	Service life expectancy is 5 years at 25°C, less at higher temperatures. (From 0.75 to 5 years depending on model, power supply rate, and ambient temperature.)	Replace the battery when its service life has passed even if a battery error has not occurred. (Battery life depends upon the model, the percentage of time in service, and ambient conditions.)

Tools Required for Inspections

Required Tools

- Slotted and Phillips-head screwdrivers
- Voltage tester or digital voltmeter
- Industrial alcohol and clean cotton cloth

Tools Required Occasionally

- Oscilloscope
- Thermometer and hygrometer (humidity meter)

7-1-2 Unit Replacement Precautions

Check the following after replacing any faulty Unit.

- Do not replace a Unit until the power is turned OFF.
- Check the new Unit to make sure that there are no errors.
- If a faulty Unit is being returned for repair, describe the problem in as much detail as possible, enclose this description with the Unit, and return the Unit to your OMRON representative.
- For poor contact, take a clean cotton cloth, soak the cloth in industrial alcohol, and carefully wipe the contacts clean. Be sure to remove any lint prior to remounting the Unit.



Precautions for Correct Use

- When replacing a CPU Unit, be sure that not only the user program but also all other data required for operation is transferred to or set in the new CPU Unit before starting operation, including DM Area and HR Area settings. If data area and other data are not correct for the user program, unexpected accidents may occur.
- Be sure to include the routing tables, Controller Link Unit data link tables, network parameters, and other CPU Bus Unit data, which are stored as parameters in the CPU Unit. Be sure to set this data again after replacing the CPU Unit.
- Refer to the *CPU Bus Unit and Special I/O Unit operation manuals* for details on the data required by each Unit.



Additional Information

The simple backup operation can be used to store the user program and all parameters for the CJ2 CPU Unit, DeviceNet Units, Serial Communications Units, and other specific Units in a Memory Card as backup files. A Memory Card and the simple backup operation can be used to easily restore data after replacing any of these Units.

Refer to *8-3-6 Data Backed Up Using Simple Backup* for details.

7-2 Replacing the Battery

The Battery in the CJ-series CPU Unit must be replaced periodically as preventative maintenance. (The Battery is a backup power supply for the CPU Unit's internal clock and RAM). This section describes how to replace the Battery.

7-2-1 Battery Replacement

Purpose of the Battery

The Battery maintains the CPU Unit internal clock and the I/O memory data held in RAM while the main power supply is OFF. If the Battery is not installed or Battery voltage drops too low, the internal clock will stop and the I/O memory data that is held will be lost when the main power supply goes OFF.

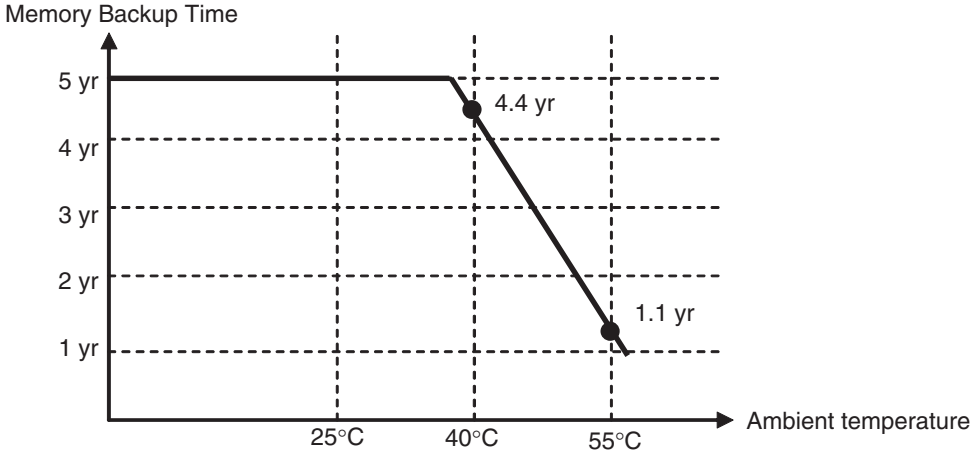
Battery Service Life and Replacement Period

At 25°C, the maximum service life for batteries is five years whether or not power is supplied to the CPU Unit while the battery is installed. The battery's lifetime will be shorter when it is used at higher temperatures and when power is not supplied to the CPU Unit for long periods.

The following table shows the approximate minimum lifetimes and typical lifetimes for the backup battery (total time with power not supplied).

Model	Approx. maximum lifetime	Approx. minimum lifetime*1	Typical lifetime*1
CJ2H-CPU□□-EIP	5 years	10,000 hours (approx. 1.1 years)	43,000 hours (5 years)

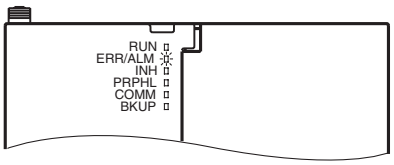
*1 The minimum lifetime is the memory backup time at an ambient temperature of 55°C. The typical lifetime is the memory backup time at an ambient temperature of 25°C.



This graphic is for reference only.

Low Battery Indicators

If the PLC Setup has been set to detect a low-battery error, the ERR/ALM indicator on the front of the CPU Unit will flash when the battery is nearly discharged.



If the Battery Error Flag (A402.04) is ON*1, first check whether the Battery is properly connected to the CPU Unit. If the battery is properly connected, replace the battery as soon as possible.

Once a low-battery error has been detected, it will take 5 days (at an ambient temperature of 25°C*2) before the battery fails assuming that power has been supplied at least once a day. Battery failure and the resulting loss of data in RAM can be delayed by ensuring that the CPU Unit power is not turned OFF until the battery has been replaced.

*1 The Battery Error Flag (A402.04) will turn ON only if the Detect Low Battery parameter in the PLC Setup has been set to detect a low-battery error. If this setting has not been made, battery errors will not be detected.

*2 The battery will discharge faster at higher temperatures, e.g., 4 days at 40°C and 2 days at 55°C.

● Replacement Battery

Use the CJ1W-BAT01 Battery Set.

Precautions for Correct Use

Be sure to install a replacement battery within two years of the production date shown on the battery's label.

Production Date



Manufactured in June 2008.

Replacement Procedure

Use the following procedure to replace the battery when the previous battery has become completely discharged.

Precautions for Safe Use

We recommend replacing the battery with the power OFF to prevent the CPU Unit's sensitive internal components from being damaged by static electricity. The battery can be replaced without turning OFF the power supply. To do so, always touch a grounded piece of metal to discharge static electricity from your body before starting the procedure.

After replacing the battery, connect a Programming Device and clear the battery error.

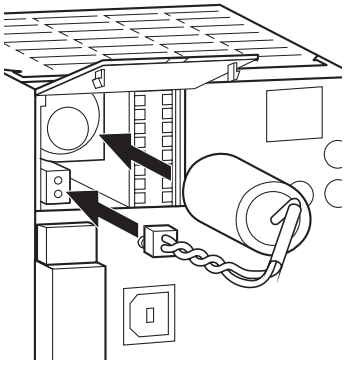
1. Turn OFF the power to the CPU Unit.

If the CPU Unit has not been ON, turn it ON for at least five minutes and then turn it OFF.

Additional Information

If power is not turned ON for at least five minutes before replacing the battery, the capacitor that backs up memory when the battery is removed will not be fully charged and memory may be lost before the new battery is inserted.

2. Open the compartment on the upper left of the CPU Unit and carefully draw out the battery.



Precautions for Safe Use

- You must complete this procedure within five minutes at 25°C after turning OFF the power to the CPU Unit to ensure memory backup. Data may be lost if more than five minutes is required.
- Never short-circuit the battery terminals; never charge the battery; never disassemble the battery; and never heat or incinerate the battery. Doing any of these may cause the battery to leak, burn, or rupturing resulting in injury, fire, and possible loss of life or property. Also, never use a battery that has been dropped on the floor or otherwise subject to shock. It may leak.
- UL standards require that batteries be replaced by experienced technicians. Always place an experienced technician in charge or battery replacement.
- Turn ON the power after replacing the battery for a CPU Unit that has been unused for a long time. Leaving the CPU Unit unused again without turning ON the power even once after the battery is replaced may result in a shorter battery life.

Additional Information

The battery error will be cleared automatically the next time the CPU Unit is turned ON after replacing the Battery.

7-2-2 Operation When Battery Is Exhausted or Not Installed

The CJ-series PLCs can operate even when the Battery is exhausted or not installed.

Continuing Operation

To have operation continue when the Battery is exhausted or not installed, set the parameter in the PLC Setup so that Battery errors are not detected.

Saving Data

The user program and parameter area data are saved in flash memory even when the Battery is exhausted or not installed. I/O memory (such as the CIO Area), however, cannot be saved.

Conditions for Operation

Operation is possible when the Battery is exhausted or not installed if the following two conditions both apply.

- There is no need to save data in I/O memory.
- There is no need to use initial settings in the DM/EM Area, or the initial settings are made by the user program.



Additional Information

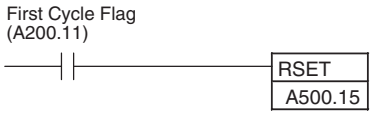
You can use the function for automatic transfer from the Memory Card at startup to store data in I/O memory and the DM/EM Area even when the Battery is exhausted or not installed.

The following table shows when the Battery is required according to the purpose of CPU Unit operation.

<table>
<tr><td colspan="3">Saving I/O memory is required.</td><td>The Battery is required.</td></tr>
<tr><td rowspan="3">Saving to I/O memory is not required.</td><td rowspan="2">DM/EM Area initial values are required at startup.</td><td>DM/EM Area initial values are set from the Memory Card.</td><td>Automatic transfer from the Memory Card at startup is set. (Pin 2 is set to ON.)</td></tr>
<tr><td>DM/EM Area initial values are set from the user program.</td><td rowspan="2">Normal operation from flash memory or operation using the Memory Card is possible.</td></tr>
<tr><td colspan="2">DM/EM Area initial values are not required at startup.</td></tr>
</table>

Restrictions

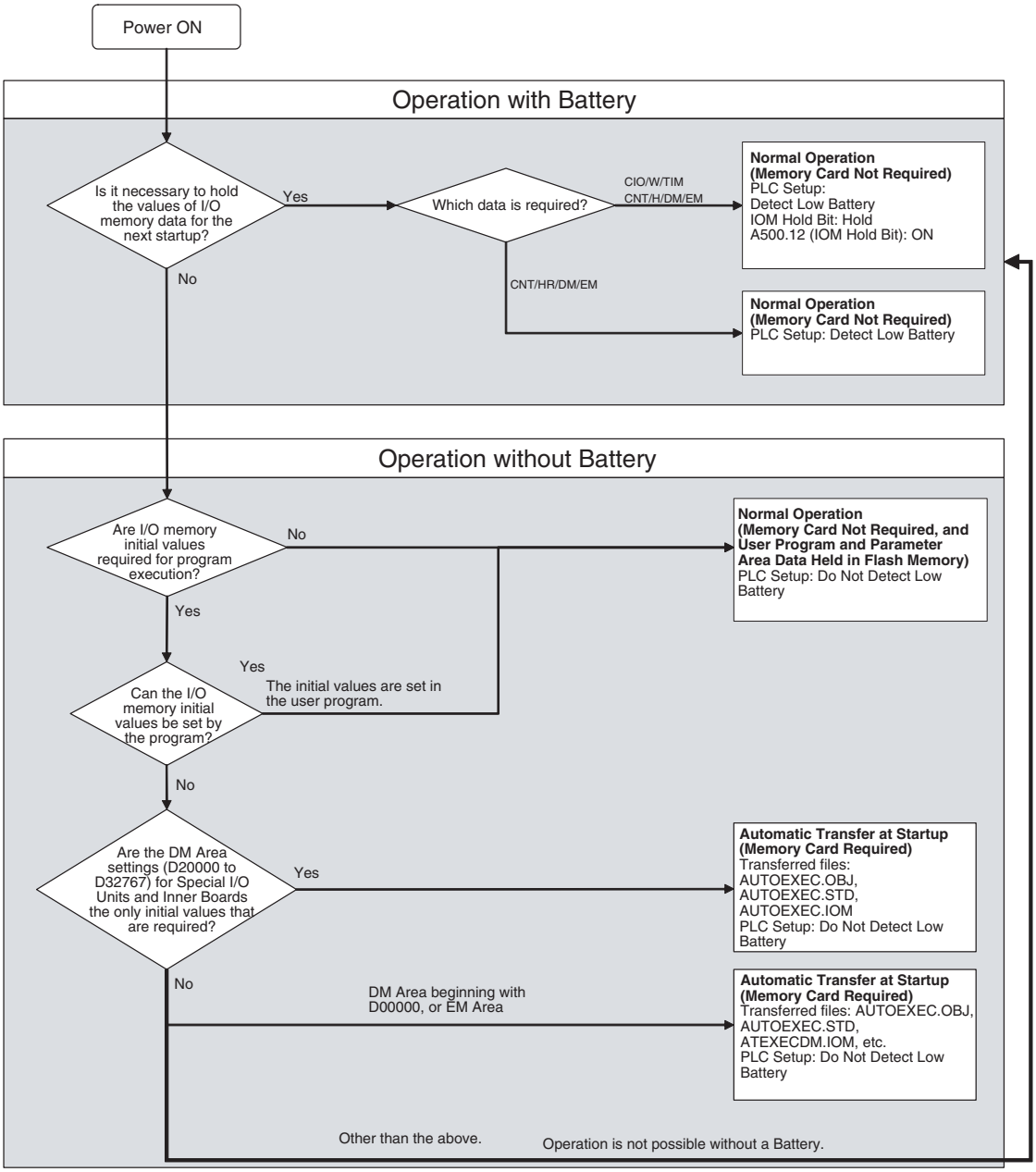
- The clock function cannot be used, so the values for the Calendar/Clock Area (A351 to A354) and the Startup Time (A510 to A511) in the Auxiliary Area will be unstable. In addition, the times at which the CPU Unit created files on the Memory Card will be unstable.
- The Total Power ON Time (A523), Power Interruption Time (A512 to A513), and Number of Power Interruptions (A514) in the Auxiliary Area will all be all zeros at startup.
- Error log data will not be held in the Error Log Area (A100 to A199) in the Auxiliary Area at startup.
- Correct values may not be held in I/O memory (including the HR, DM, and EM Areas) at startup. In the PLC Setup, set the IOM Hold Bit (A500.12) and the Forced Status Hold Bit (A500.13) to not be held at startup.
- The value for the Output OFF Bit (A500.15) will become unstable. Moreover, when the Output OFF Bit turns ON, the outputs of all Output Units will turn OFF. To prevent the outputs of all Output Units from turning OFF at startup, take countermeasures such as writing the following program section into the ladder program.



- Bank 0 will be the EM current bank at startup.
- Files will not be held in the EM file memory (EM data converted to flash memory) and the file memory function cannot be used. Make the EM file memory setting again in the PLC Setup, and format the EM file memory.

Setup Method

The following flowchart shows the flow of setup operations for the CPU Unit.


Power ON
Operation with Battery
Is it necessary to hold the values of I/O memory data for the next startup?
Yes
Which data is required?
CIO/W/TIM
CNT/H/DM/EM
Normal Operation
(Memory Card Not Required)
PLC Setup:
Detect Low Battery
IOM Hold Bit: Hold
A500.12 (IOM Hold Bit): ON
No
CNT/HR/DM/EM
Normal Operation
(Memory Card Not Required)
PLC Setup: Detect Low Battery
Operation without Battery
Are I/O memory initial values required for program execution?
No
Normal Operation
(Memory Card Not Required, and User Program and Parameter Area Data Held in Flash Memory)
PLC Setup: Do Not Detect Low Battery
Yes
Yes
Can the I/O memory initial values be set by the program?
The initial values are set in the user program.
No
Are the DM Area settings (D20000 to D32767) for Special I/O Units and Inner Boards the only initial values that are required?
Yes
Automatic Transfer at Startup
(Memory Card Required)
Transferred files:
AUTOEXEC.OBJ,
AUTOEXEC.STD,
AUTOEXEC.IOM
PLC Setup: Do Not Detect Low Battery
No
DM Area beginning with D00000, or EM Area
Automatic Transfer at Startup
(Memory Card Required)
Transferred files: AUTOEXEC.OBJ,
AUTOEXEC.STD,
ATEXECDM.IOM, etc.
PLC Setup: Do Not Detect Low Battery
Other than the above.
Operation is not possible without a Battery.

7-3 Power Supply Unit Replacement Time

Principle of Replacement Notification

The Power Supply Unit has a built-in electrolytic capacitor. The electrolytic capacitor is impregnated with electrolytic solution that starts to penetrate the sealing rubber from the time of manufacture. As time elapses, the internal electrolytic solution continues to evaporate, resulting in decreased electrostatic capacity and deterioration in other characteristics. Over time, the characteristic deterioration of the electrolytic capacitor prevents the Power Supply Unit from being utilized to its full capacity. In particular, the speed at which the electrolytic capacitor deteriorates fluctuates greatly with the ambient temperature (generally, a temperature rise of 10°C will double the rate of a reaction, as stated by Arrhenius' law).

The CJ1W-PA205C Power Supply Unit with Replacement Notification monitors the internal temperature of the Power Supply Unit while the power is turned ON, and calculates the level of deterioration of the electrolytic capacitor from the operating time and internal temperature. The replacement notification function displays the approximate time until the Power Supply Unit will stop functioning at its full capacity due to the characteristic deterioration of the electrolytic capacitor, based on the calculated level of deterioration. When 6 months are remaining until replacement is required, the alarm output will turn OFF.

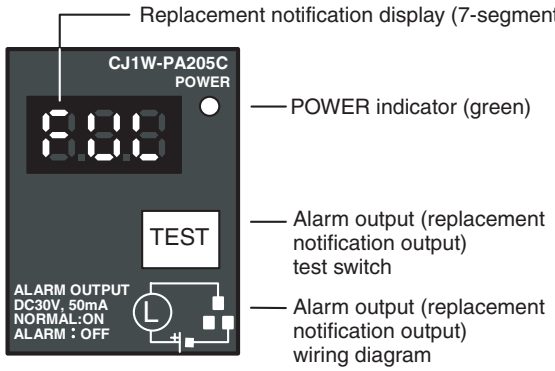
Note The replacement notification function provides an indication of when the deterioration of the electrolytic capacitor will prevent the power supply functioning at its full capacity. It does not provide information on failures occurring due to other causes.

Power Supply Unit with Replacement Notification

Model	Specifications
CJ1W-PA205C	Output capacity: 5 A at 5 VDC, 0.8 A at 24 VDC, total of 30 W With replacement notification

Power Supply Unit Replacement Notification Module

● CJ1W-PA205C

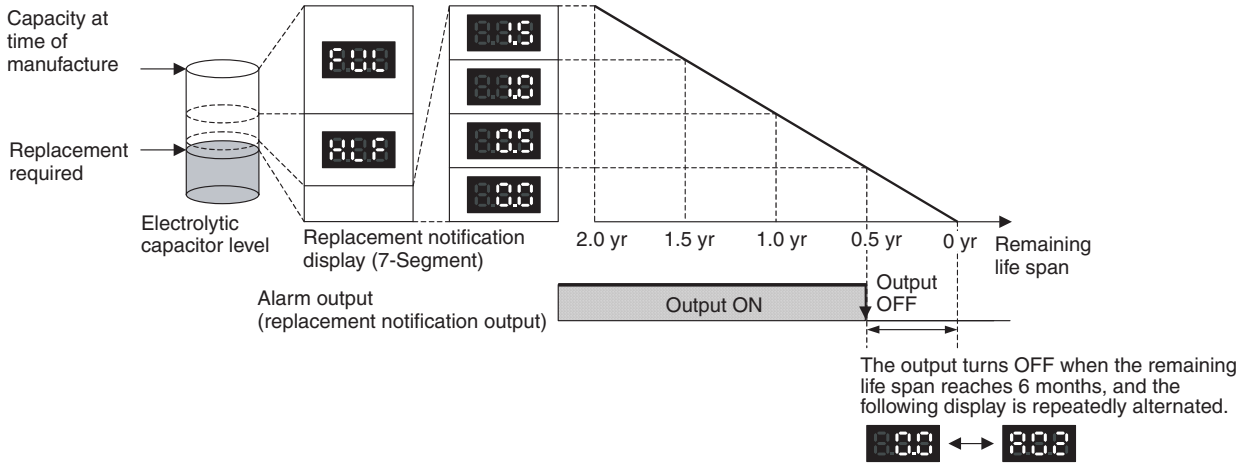


Function

● Replacement Notification Function Displays

The replacement notification of the Power Supply Unit is shown using three 7-segment display characters.

- At time of purchase “FUL” is displayed. The display changes to “HLF” as the electrolytic capacitor deteriorates (“HLF” may not be displayed, depending on the operating environment).
- When the time until replacement is required drops below 2 years, the display will change corresponding to the operating time from “1.5” to “1.0” to “0.5” to “0.0”/”A02.” When the remaining service life reaches 6 months or less, the display will alternate between “0.0” and “A02” in 2-second intervals.



Note 1 The time remaining until replacement does not include periods when the power is turned OFF.

2 Until approximately one month of operating time has accumulated, the display will always be “FUL” and the alarm output will remain ON (conducting) due to the estimated deterioration speed.

3 The time remaining until replacement will vary the operating and storage conditions, so periodically check the display.

4 Fluctuation in the time remaining until replacement may result in the alarm output repeatedly turning ON and OFF.

5 The precision of the replacement notification function will be adversely affected by applications in which the power is frequently turned ON and OFF.

6 Due to the service life of the electronic components, replace the Power Supply Unit approximately 15 years after purchase, even if the replacement notification display or output has not indicated that replacement is required.

● Alarm Output (Replacement Notification Output)

The output remains ON until the remaining service life drops below 6 months and then turns OFF.

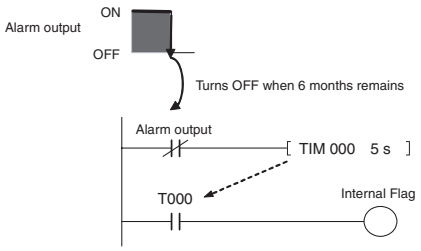
Note The alarm output will also turn OFF under the following conditions.

- The AC input to the Power Supply Unit is turned OFF.
- An error is detected by the self-diagnostic function.
- The TEST switch is pressed for at least 3 seconds.

Additional Information

Example of Using the Alarm Output:

Monitoring Power Supply Replacement Notification in the System (6 Months or Less Until Replacement Is Required)



The Flag is programmed to allow for the delay in the alarm output at system startup. The Flag does not turn ON when the alarm output is ON (normal operation). When the alarm output turns OFF (replacement required), the Flag turns ON, and the replacement notification can be monitored from the system.

● Maintenance Function Using the TEST Switch

- Press the TEST switch for at least 3 seconds to display “A02” and force the alarm output OFF. Release the switch to return to normal operating status.
  The TEST switch is used initially or periodically to check the connection status between the alarm output and external devices.
- Press the TEST switch for less than 3 seconds to display the unit version information for the Power Supply Unit.

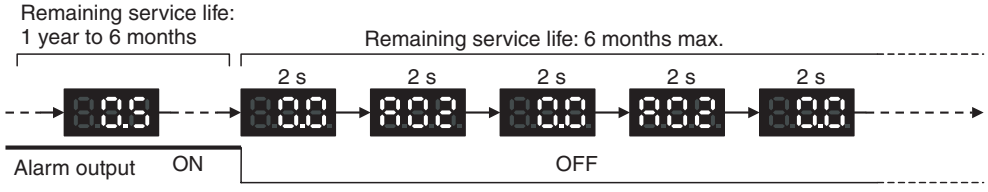
Precautions for Correct Use

- Replace the Power Supply Unit within 6 months when the display on the front panel of the Power Supply Unit alternates between 0.0 and A02 or the alarm output automatically turns OFF.
- Maintain an ambient storage temperature of –20 to 30°C and humidity of 25% to 70% when storing the product (with the power turned OFF) for longer than 3 months to keep the replacement notification function in optimum working condition. The replacement time is calculated from when the power is turned ON only. The precision of the replacement period will decline if the electrolytic capacitor deteriorates during storage.

Display and Alarm Output Operation

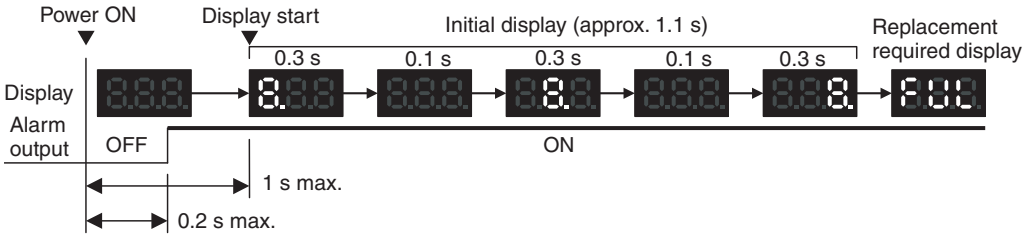
● Normal Display: Replacement Notification Display

When 6 months or less are remaining until replacement is required, the display will alternate between “0.0” and “A02” (in 2 second intervals), and the alarm output will turn OFF.

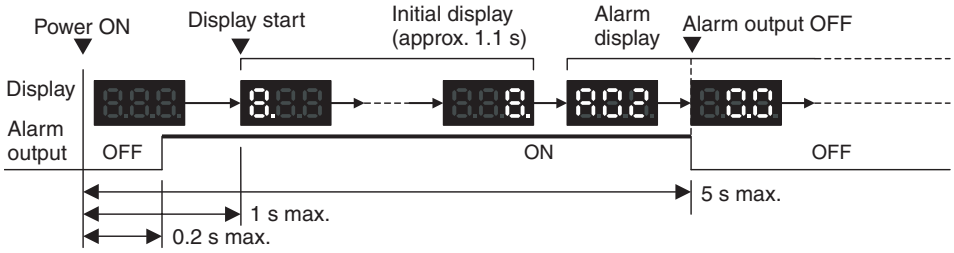


Operation When Turning ON the Power

The following initial display is shown when the power is turned ON, after which the replacement notification is displayed. The alarm output turns ON approximately 0.2 seconds after the power is turned ON.

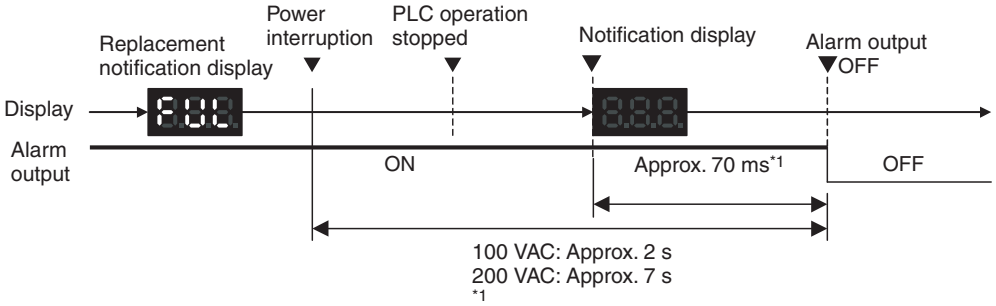


When replacement is already required, the alarm display will follow the initial display. The alarm output will turn ON approximately 0.2 seconds after the power is turned ON, and then turn OFF after approximately 5 seconds.



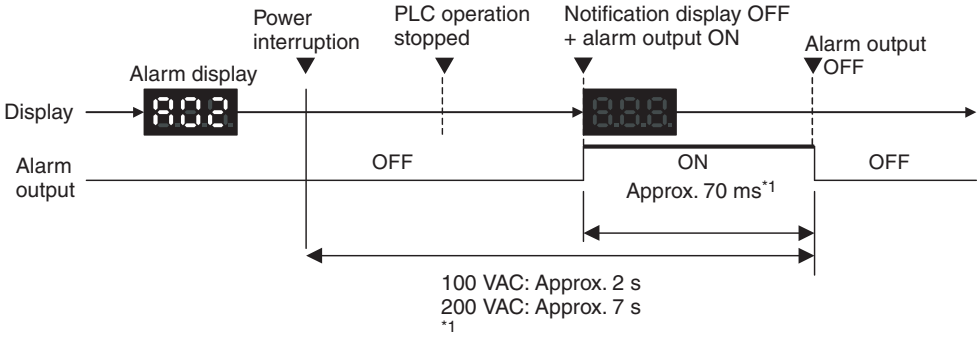
Operation at Power OFF

When the power is turned OFF, the display will turn OFF after the PLC operation stops. The alarm output will turn OFF after the display turns OFF.



*1 The values shown are reference values (calculated for a no-load status on the Power Supply Unit's output).

If replacement is already required, the display will turn OFF after the PLC operation stops. When the display turns OFF, the alarm output will turn ON momentarily and then turn OFF again.

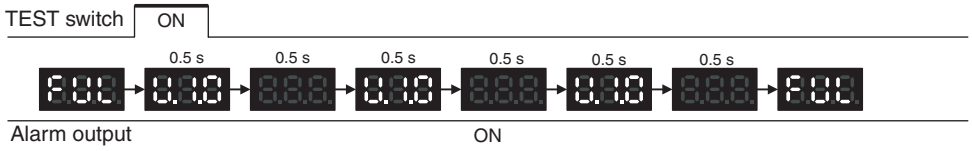


*1 The values shown are reference values (calculated for a no-load status on the Power Supply Unit's output).

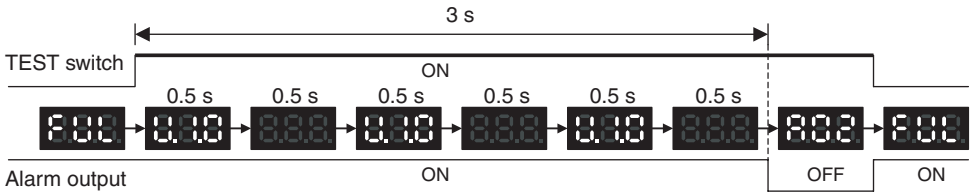
Operation When TEST Switch Is Pressed

The following operation will be performed when the TEST switch on the replacement notification function module is pressed. When the switch is pressed for less than 3 seconds, the unit version will be displayed 3 times at 0.5-second intervals. When the switch is pressed for at least 3 seconds, the alarm output will momentarily turn OFF, and the alarm display A02 will be shown. The operation will return to the normal display and output when the switch is released. Use the TEST switch to check the connection between the replacement notification output and devices.

- Operation when TEST switch is pressed for less than 3 seconds.



- Operation when TEST switch is pressed for less than 3 seconds.



Precautions for Correct Use

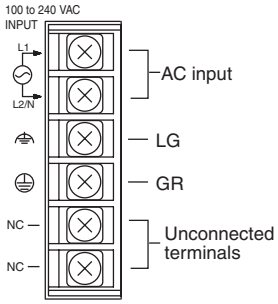
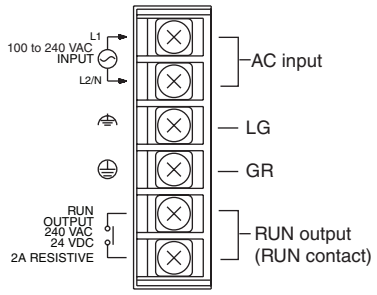
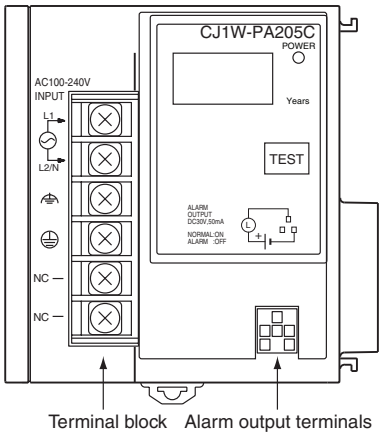
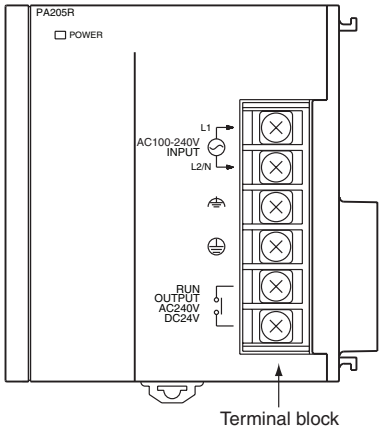
Under normal application conditions, the replacement notification function will operate after several years or even tens of years. When using a Power Supply Unit for an extended period of time, periodically check operation with the TEST switch as described above and be sure the alarm output functions properly.

Self-diagnostic Function

Error name	Display	Alarm output status	Error details (cause)	Recovery method
Unit overheated error	Hot	OFF	Internal overheating has occurred in the Power Supply Unit as a result of usage under conditions that exceed the specified values, insufficient ventilation, or incorrect installation.*1	Remove the cause of the overheating error.
Unit error	E03	OFF	System error from external noise or hardware malfunction.	Turn ON the input's power supply again. If the Unit does not recover, the error may be caused by a Unit malfunction. Consult with your OMRON representative.

*1 If the error continues for 3 hours or longer, the replacement notification function will be disabled. Even if the cause of the overheating is removed, the display will continue as “Hot,” and the notification output will remain OFF. In this state, the internal parts may deteriorate even if the PLC operation is normal, so replace the Power Supply Unit.

Comparison between the CJ1W-PA205C and CJ1W-PA205R

Item	CJ1W-PA205C	CJ1W-PA205R (for comparison)
RUN contact output	Not supported	Supported
Terminal block arrangement	**CJ1W-PA205C**  	**CJ1W-PA205R** 
Terminal block position	Located on the left side of the Unit.  	Located on the right side of the Unit. 
POWER indicator	On replacement notification module	On hood of Power Supply Unit
Replacement notification	Supported (7-segment display + transistor outputs)	Not supported

8

Backup Operations

This section describes operations used to back up and restore data.

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8-2 Using a Computer to Back Up Data 8-3

8-2-1 PLC Backup Tool 8-3

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8-3-3 Verifying Backup Operations with Indicators 8-10

8-3-4 Related Auxiliary Bits/Words 8-12

8-3-5 Time Required for Simple Backup 8-12

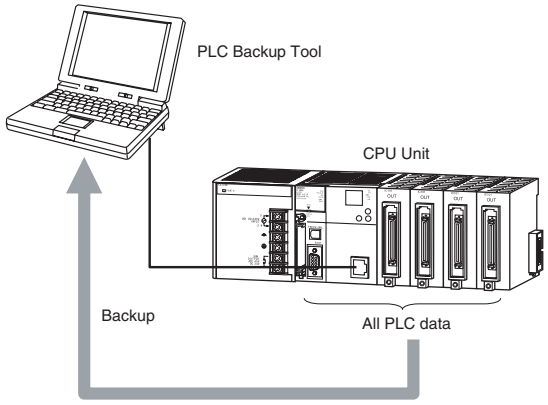
8-3-6 Data Backed Up Using Simple Backup 8-12

8-1 Backing Up Data

There are two methods for backing up PLC data.

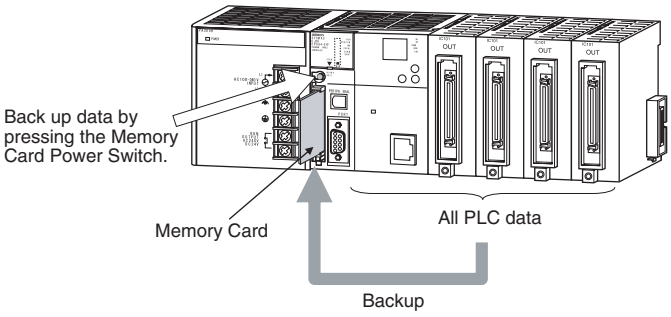
Using a Computer to Back Up Data to the Computer

- Operation: PLC Backup Tool running on the personal computer
- Backup destination: Computer hard disk



Using Front-panel Switches on the CPU Unit to Back Up Data to a Memory Card

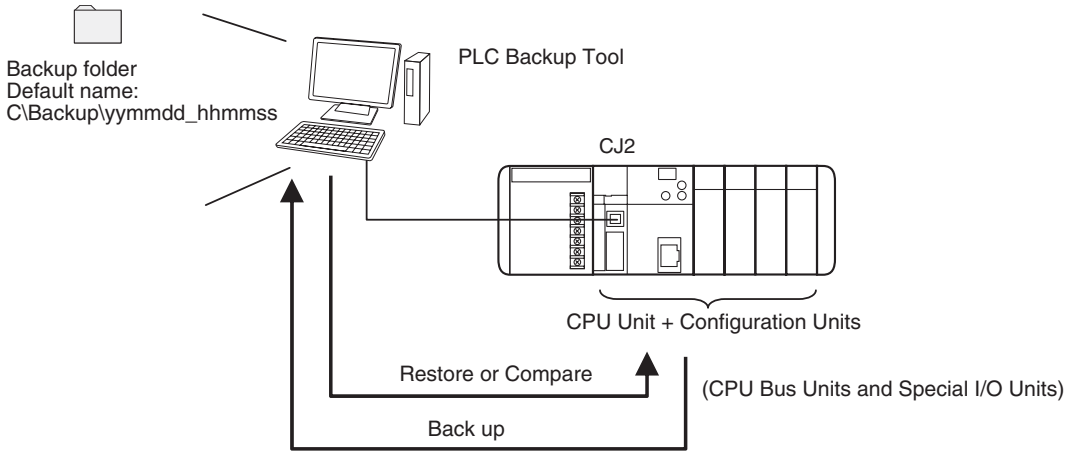
- Operation: DIP switch and Memory Card Power Switch
- Backup destination: A Memory Card inserted in the CPU Unit



8-2 Using a Computer to Back Up Data

8-2-1 PLC Backup Tool

The PLC Backup Tool can be used to back up, compare, and restore data, such as programs and unit parameters, of all the Units or of only specified Units in a PLC that is connected online.



● Applications

The PLC Backup Tool can be used for the following applications.

- Backing up all of the data from the PLC
- Comparing all of the data in the PLC with the data backed up in the computer
- Transferring all of the data to a PLC that has the same system configuration as another PLC
- Transferring data to a Unit that has been replaced, e.g., when the Unit has failed

● Applicable Units

Applicable Unit	Description
CPU Unit	CS/CJ/CP-series PLCs, all models and all versions Data in the following Units is not backed up: • Screen data for an NSJ Controller • SYSMAC SPU Unit data • Customizable Counter Unit data
Special I/O Units and CPU Bus Units	Refer to the list of backup Units in the help files for the PLC Backup Tool.

● Applicable Data

Applicable Unit	Description
CPU Unit	User program, symbols tables, rung comments, program indices, parameters (PLC Setup, registered I/O tables, routing tables, Ethernet settings, and all other data in the initial setting areas), I/O memory, forced status (backup and comparison only), and EM file memory data (backup only)
Special I/O Units and CPU Bus Units	Parameter settings and data stored inside the Unit (e.g., programming created with Support Software)

● Restrictions

The following restrictions apply.

- Forced Status
  Forced status cannot be restored. If you attempt to restore forced status, the address of the force-set/reset bits will be displayed in the log display area. Use the CX-Programmer or Switch Box to manually force-set/reset the displayed bits.
- Data Stored in EM File Memory (Part of the EM Area Converted to File Memory)
  EM file memory cannot be compared or resorted.
  EM file memory backups are saved in the CPU\EM_FILES Folder that will be created within the backup file destination folder. Restore EM file memory manually by using the PLC Memory Card Window in the CX-Programmer to write the data to memory.
- Restrictions in Comparing and Restoring I/O Memory
  The CIO Area and Auxiliary Area data in the I/O memory cannot be compared or restored.

8-2-2 PLC Backup Tool Operations

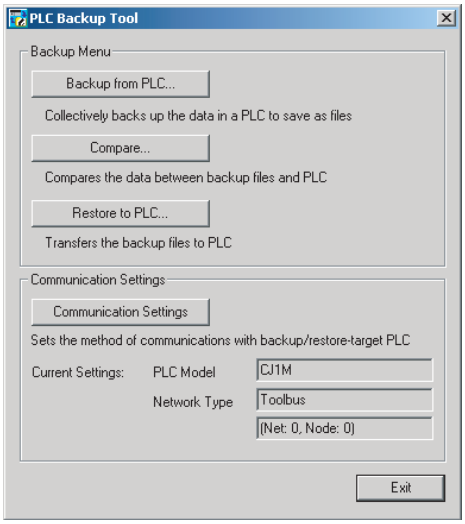
An overview of the PLC Backup Tool is provided below. For details on specific procedures and functions, refer to the *CX-Programmer Operation Manual* (Cat. No. W446).

● Starting the PLC Backup Tool

Either of the following methods can be used to start the PLC Backup Tool.

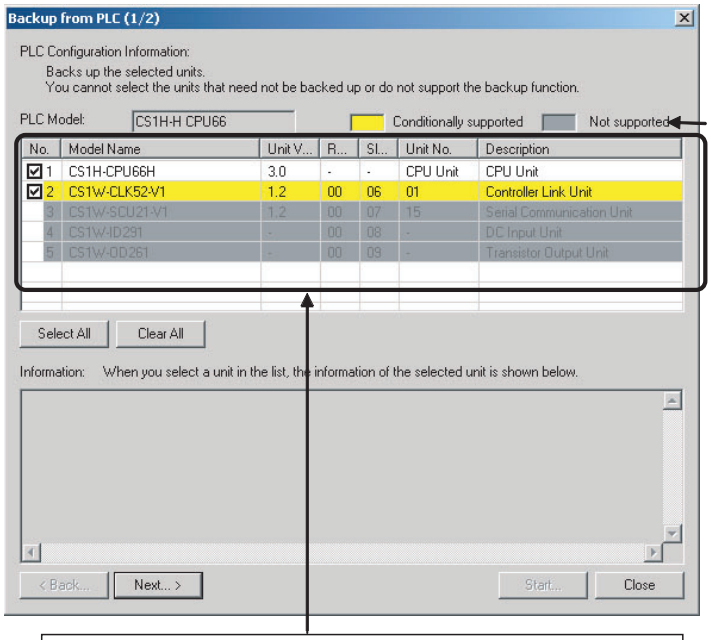
- Select ***PLC Backup Tool*** from the CX-Programmer Tools Menu.
- Select ***Programs*** – ***OMRON***– ***CX-One*** – ***CX Programmer*** – ***PLC Backup Tool*** from the Windows Start Menu.

The PLC Backup Tool Dialog Box will be displayed.



● Backing Up Data

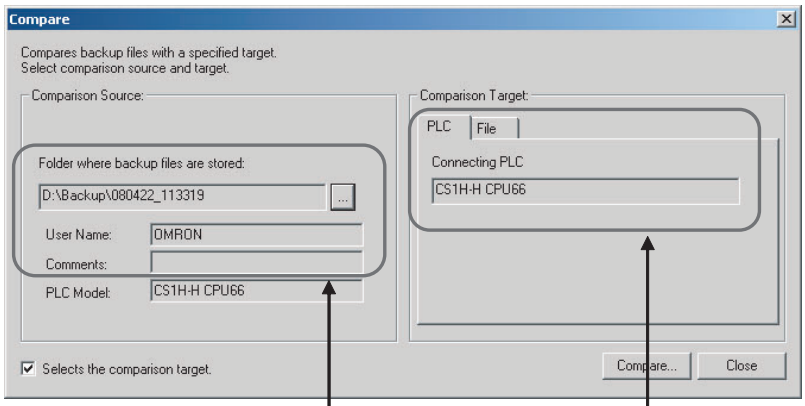
The data in the connected PLC can be backed up to the computer as a batch. A folder named with the date and time will be automatically created under the user-specified folder, and the backup files will be created in that folder.


Backup from PLC (1/2)
PLC Configuration Information:
Backs up the selected units.
You cannot select the units that need not be backed up or do not support the backup function.
PLC Model:
CS1H-H CPU66
Conditionally supported
Not supported
No.
Model Name
Unit V...
R...
Sl...
Unit No.
Description
1 CS1H-CPU66H 3.0 - - CPU Unit CPU Unit
2 CS1W-CLK52-V1 1.2 00 06 01 Controller Link Unit
3 CS1W-SCU21-V1 1.2 00 07 15 Serial Communication Unit
4 CS1W-ID291 - 00 08 - DC Input Unit
5 CS1W-OD261 - 00 09 - Transistor Output Unit
Select All
Clear All
Information:
When you select a unit in the list, the information of the selected unit is shown below.
< Back...
Next... >
Start...
Close

All Units in the PLC are displayed here.
Individual Units can be selected for backup.

● Comparing Data

Data in backup files can be compared with data from other backup files or data from connected PLC. The comparison results will be displayed.



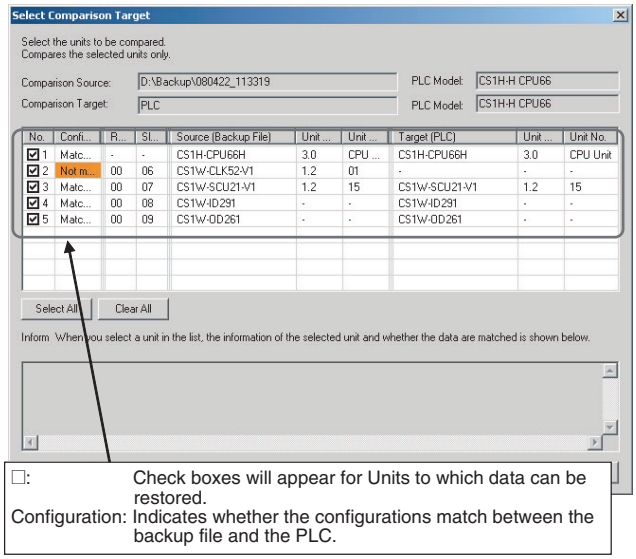
Specify the source backup file on the computer.

Specify the target PLC or backup file to compare.
PLC: The currently connected PLC will be displayed as the target.
File: Specify another backup file on the computer as the target.

Backup files can be restored after the comparison results have been displayed. Also, the comparison results can be saved in a CSV file.

● Restoring Data

PLC data can be restored to a previous state by transferring backup file data to a connected PLC. Before the data is restored, a comparison will be made automatically with the applicable PLC and the results will be displayed.


Select Comparison Target
Select the units to be compared.
Compares the selected units only.
Comparison Source:
D:\Backup\080422_113319
PLC Model:
CS1H-H CPU66
Comparison Target:
PLC
PLC Model:
CS1H-H CPU66
No.
Confi...
R...
Sl...
Source (Backup File)
Unit ...
Unit ...
Target (PLC)
Unit ...
Unit No.
1 Matc... - - CS1H-CPU66H 3.0 CPU ... CS1H-CPU66H 3.0 CPU Unit
2 Not m... 00 06 CS1W-CLK52-V1 1.2 01 - - -
3 Matc... 00 07 CS1W-SCU21-V1 1.2 15 CS1W-SCU21-V1 1.2 15
4 Matc... 00 08 CS1W-ID291 - - CS1W-ID291 - -
5 Matc... 00 09 CS1W-OD261 - - CS1W-OD261 - -
Select All
Clear All
Inform When you select a unit in the list, the information of the selected unit and whether the data are matched is shown below.

□: Check boxes will appear for Units to which data can be restored.
Configuration: Indicates whether the configurations match between the backup file and the PLC.

Before the data is restored, the contents of the data can be checked by starting the Support Software for that Unit.

Precautions for Correct Use

The CPU Unit will be changed to PROGRAM mode before restoring the data. This will stop operation. Be sure it is safe to stop CPU Unit operation before restoring the data.

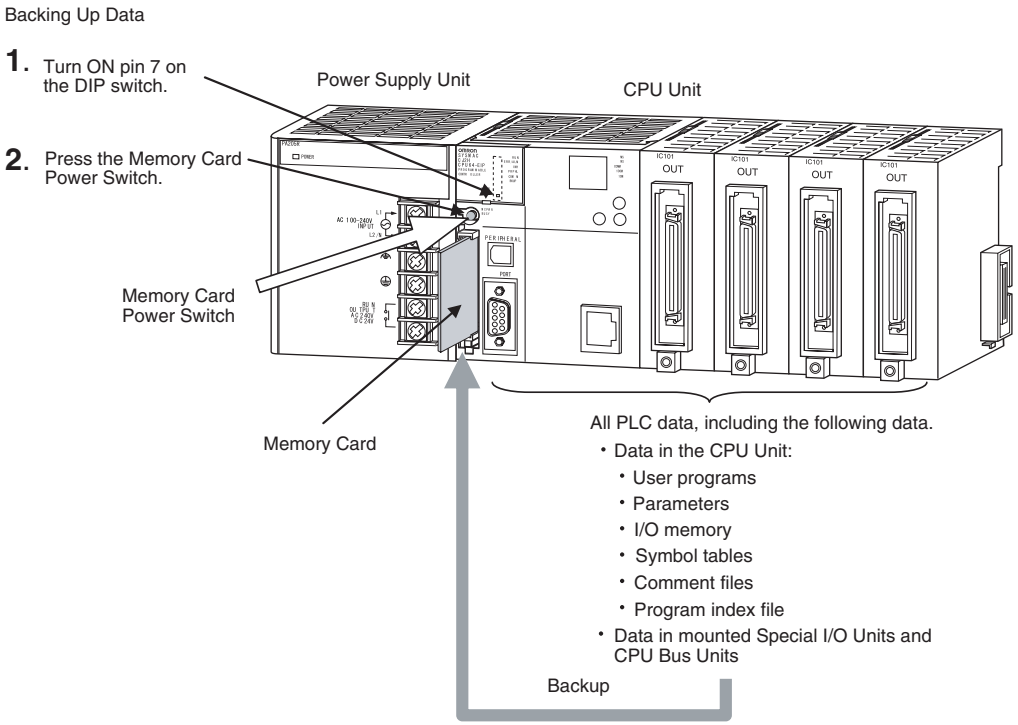
Precautions for Safe Use

- Sufficiently check the data that is selected for restoring before performing the next step. If the correct data is not restored, unexpected operation may occur in the controlled system after the data is restored.
- Some Special I/O Units and CPU Bus Units operate with parameters that are stored in the CPU Unit. If one of these Units is selected for backup, restrictions will be displayed in the Comments Area of the Backup from PLC Dialog Box. Confirm the restrictions, and always select the Special I/O Unit or CPU Bus Unit together with the CPU Unit when backing up or restoring data. If the data from both Units is not backed up or restored together, unexpected operation may occur in the controlled system.
- If there are any backup restrictions for the Units to which data is being restored, the restrictions will be displayed in the Comments Area of the Backup from PLC Dialog Box. Confirm the restrictions, and always take the required measures. If required measures are not taken, unexpected operation may occur in the controlled system after the data is restored.
- Confirm that stopping PLC operation will not create any problems before restoring data during PLC operation. If the PLC stops at an unanticipated time, unexpected operation may occur in the controlled system.
- Always turn the power supply to the PLC OFF and then ON after restoring data. If the power supply is not turned OFF and then ON, memory in the PLC may not be updated to the restored data, which may cause unexpected operation of the controlled system.
- Forced status can be backed up, but it cannot be restored. If you restored data that contained forced status, use the CX-Programmer after restoring the data to force-set or force-reset bits as required. If required bits are not force-set or force-reset, differences in the forced status in memory may cause unexpected operation of the controlled system.

8-3 Simple Backup

8-3-1 Overview

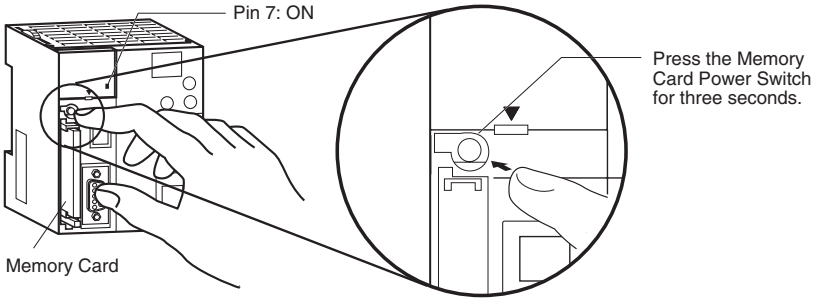
The simple backup operation can be used to back up all PLC data to a Memory Card, or to restore or compare the data, by using a simple DIP switch setting and the Memory Card Power Switch. No Support Software is required.


Backing Up Data
1. Turn ON pin 7 on the DIP switch.
2. Press the Memory Card Power Switch.
Power Supply Unit
CPU Unit
Memory Card Power Switch
Memory Card
All PLC data, including the following data.
• Data in the CPU Unit:
• User programs
• Parameters
• I/O memory
• Symbol tables
• Comment files
• Program index file
• Data in mounted Special I/O Units and CPU Bus Units
Backup

Backup operation	DIP switch on front of CPU Unit	Procedure	
	Pin 7		
Backing up data to the Memory Card	ON	Press the Memory Card Power Switch for three seconds.	The data can be backed up regardless of the CPU Unit operating mode.
Restoring data from the Memory Card		Turn the PLC OFF and ON again. (Data restoration is given priority over the automatic transfer at startup.)	After the data has been restored, the operating mode will remain in PROGRAM mode until the PLC power is turned OFF.
Comparing data to the Memory Card	OFF	Press the Memory Card Power Switch for three seconds.	The data can be compared regardless of the CPU Unit operating mode.

8-3-2 Operating Procedures

Backing Up Data from the CPU Unit to the Memory Card



1. Insert the Memory Card into the CPU Unit. The MCPWR indicator will light and the BUSY indicator will flash (meaning the Memory Card is being accessed) and then turn OFF.
2. Turn ON pin 7 on the CPU Unit's DIP switch.
3. Press the Memory Card Power Switch for three seconds until the BUSY indicator lights, and then release the switch.

   The PLC will start backing up data to the Memory Card. The MCPWR indicator will flash once and then light while the data is being written. At the same time the BUSY indicator will flash. The MCPWR and BUSY indicators will both turn OFF when the operation is completed normally.
4. Turn OFF pin 7 on the CPU Unit's DIP switch.

Restoring Data from the Memory Card to the CPU Unit

1. Turn OFF the PLC power supply.
2. Insert the Memory Card containing the backup files into the CPU Unit.
3. Turn ON pin 7 on the CPU Unit's DIP switch.
4. Turn ON the PLC power supply.

   The PLC will start restoring the data from the Memory Card. The MCPWR indicator will flash once and then light while the data is being read. At the same time the BUSY indicator will flash.

   The MCPWR and BUSY indicators will both turn OFF when the operation is completed normally. If the MCPWR indicator flashes five times, or if only the BUSY signal turns OFF, it means that an error has occurred. (Refer to *8-3-3 Verifying Backup Operations with Indicators*.)
5. Turn OFF pin 7 on the CPU Unit's DIP switch.

Note 1 The backup function will override the automatic transfer at startup function, so the backup files will be read to the CPU Unit when the PLC is turned ON even if pin 2 of the DIP switch is ON.

2 Data will not be read from the Memory Card to the CPU Unit if pin 1 of the DIP switch is ON (write-protecting program memory).

Additional Information

- When the backup files are read from the Memory Card by the backup function, the status of I/O memory and force-set/force-reset bits will be cleared unless the necessary settings are made in the Auxiliary Area and PLC Setup.
  If the IOM Hold Bit (A500.12) is ON and the PLC Setup is set to maintain the IOM Hold Bit Status at Startup when the backup files are written, the status of I/O memory data will be maintained when data is read from the Memory Card.
  If the Forced Status Hold Bit (A500.13) is ON and the PLC Setup is set to maintain the Forced Status Hold Bit Status at Startup when the backup files are written, the status of force-set and force-reset bits will be maintained when data is read from the Memory Card.
- After the simple backup operation has been used to restore data from the Memory Card to the PLC, the operating mode will remain in PROGRAM mode and cannot be changed to MONITOR or RUN mode until the PLC power is turned OFF. After restoring the data, turn OFF the power, change the setting of DIP switch pin 7, and then turn the power back ON.
- File backups may take from several seconds to several minutes. For information on execution times refer to *8-3-5 Time Required for Simple Backup*.

Comparing Data in the Memory Card and CPU Unit

1. Insert the Memory Card containing the backup files into the CPU Unit.

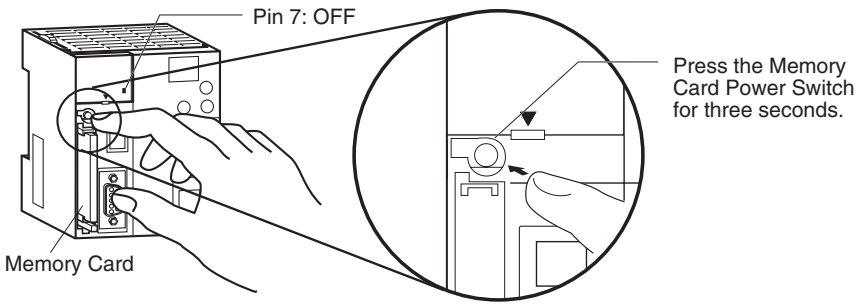
The MCPWR indicator will light and the BUSY indicator will flash and then turn OFF.

2. Turn OFF pin 7 on the CPU Unit's DIP switch.

3. Press the Memory Card Power Switch for three seconds until the BUSY indicator lights, and then release the switch.

The PLC will start comparing the data in the PLC and the data in the backup file on the Memory Card. The MCPWR indicator will flash once and then light while the data is being written. At the same time the BUSY indicator will flash.

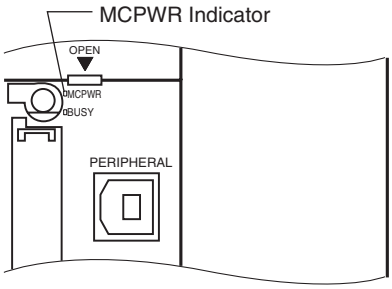
The MCPWR and BUSY indicators will both turn OFF if the data matches. If the MCPWR and BUSY indicators both flash, it means that the data does not match or that an error has occurred. (Refer to *8-3-3 Verifying Backup Operations with Indicators*.)



Note If an error occurs during writing or comparison, the MCPWR indicator will flash. Press the power switch to stop the flashing and to turn ON the MCPWR indicator.

8-3-3 Verifying Backup Operations with Indicators

The status of the Memory Card Power (MCPWR) indicator shows whether a simple backup operation has been completed normally or not.



Backup operation	Normal completion*1	Error occurred	
	MCPWR status	MCPWR status	Error
Backing up data from the CPU Unit to the Memory Card	MCPWR Lit ↓ Remains lit while the Memory Card Power Switch is pressed. ↓ MCPWR Flashes once. ↓ MCPWR Lit while writing. ↓ MCPWR OFF after data is written.	MCPWR Lit ↓ Remains lit while the Memory Card Power Switch is pressed. ↓ MCPWR Remains flashing.	The data was not backed up due to one of the following errors, and no backup file was created. • Insufficient Memory Card capacity • Memory error in CPU Unit • I/O bus error • Data was not read from the Unit to be backed up.

Backup operation	Normal completion*1	Error occurred	
	MCPWR status	MCPWR status	Error
Restoring data from the Memory Card to the CPU Unit	MCPWR Lit when power is turned ON. ↓ MCPWR Flashes once. ↓ MCPWR Lit while reading. ↓ MCPWR OFF after data is read.	MCPWR Lit when power is turned ON. ↓ MCPWR Flashes five times. ↓ MCPWR Goes OFF.	The data was not restored due to one of the following causes. • Program in Memory Card exceeds CPU Unit capacity • Required backup files do not exist in Memory Card. • Program can't be written because it is write-protected (Pin 1 of the DIP switch is ON.) • The EM file was not complete, i.e., a portion was missing. • There are fewer CPU Unit EM banks than backup EM files.
		MCPWR Lit when power is turned ON. ↓ MCPWR Flashes once. ↓ MCPWR Remains lit.	The I/O tables are not correct (e.g., the same unit number was set twice).
		MCPWR Same as for normal completion. + Special I/O or CPU Bus Unit ERR indicator H8 7-segment LED indicator Displayed as “H8”	• A Unit was added to the configuration since the data was backed up. • The unit number settings for Special I/O Units or CPU Bus Units are not correct.
		MCPWR Same as for normal completion. + INEE Board READY indicator Flashing	A Unit was added to the configuration since the data was backed up.
Comparing data between the CPU Unit and the Memory Card	MCPWR Lit ↓ Remains lit while the Memory Card Power Switch is pressed. ↓ MCPWR Flashes once. ↓ MCPWR Lit while comparing. ↓ MCPWR OFF after data is compared.	MCPWR Lit ↓ Remains lit while the Memory Card Power Switch is pressed. ↓ MCPWR Remains flashing.	The following comparison errors can occur: • Memory error in CPU Unit*2 • Incorrect I/O tables (e.g., the same unit number set twice) • Comparison results (of backup files on Memory Card and data in PLC) do not match. • Required backup files do not exist in Memory Card.*2 • I/O bus error

*1 When the backup operation is completed normally, power to the Memory Card will go OFF when the MCPWR indicator goes OFF. If the Memory Card will be used again, press the Memory Card Power Switch to supply power and execute the desired operation.

*2 The backup files for Units and Boards are also compared.

8-3-4 Related Auxiliary Bits/Words

Name	Address	Description
File Memory Operation Flag	A343.13	ON when any of the following are being performed. OFF when execution has been completed. • Memory Card detection • CMND instruction executed for local CPU Unit • FREAD/FWRIT instructions • Program replacement via special control bits • Simple backup operation Wiring data to or verifying the contents of the Memory Card is not possible while this flag is ON.
EM File Memory Starting Bank	A344	When the CPU Unit starts reading from the Memory Card, it references this value. If the maximum EM bank number of the BKUPEM□.IOM files (maximum consecutive bank number counting from 0) matches the maximum bank number of the CPU Unit, the EM area will be formatted based on the value in this word. If the maximum EM bank numbers do not match, the EM Area will revert to its unformatted condition.

8-3-5 Time Required for Simple Backup

The following tables list the benchmark execution times for the simple backup operation. The execution time will depend on the Unit configuration, cycle time, and Memory Card. These times were measured under the following conditions:

Configuration: CPU Unit only

Operating mode: PROGRAM

Operating mode	Writing to Memory Card	Reading from Memory Card
User program: 120K steps, No network symbols	Approx. 7 s	Approx. 20 s
User program: 120K steps, Network symbols: 20,000	Approx. 19 s	Approx. 68 s

Additional Information

The Units that are backed up for the simple backup operation are predetermined. You cannot specify which Units are backed up and which are not.

8-3-6 Data Backed Up Using Simple Backup

The files and applicable data transferred between the Memory Card and CPU Unit using the simple backup operation are listed below. The file name is fixed as BACKUP□□.

Program Files

Contents	Backup	Restore	Compare	File name	Extension
User program, network symbols	Yes	Yes	Yes	BACKUP	.OBJ

Symbol Tables, Comments, and Program Index Files

Contents	Backup	Restore	Compare	File name	Extension
Symbol table files	Yes	Yes	Yes	BKUPSYM	.SYM
Comment files				BKUPCMT	.CMT
Program index file				BKUPPRG	.IDX

Parameter Files

Contents	Backup	Restore	Compare	File name	Extension
• PLC Setup • PLC name • Registered I/O tables • Routing tables • CPU Bus Unit setup • Etc.	Yes	Yes	Yes	BACKUP	.STD

Data

There are five types of data files, as shown below, when the simple backup operation is used for backing up data (creating files) on the Memory Card or for restoring or comparing data from the Memory Card.

- BACKUP.IOM
- BKUPIOR.IOR
- BACKUPDM.IOM
- BKUPEM□.IOM
- BKUPEF□.IOM

These files are used exclusively for the simple backup operation. With the exception of BKUPIOR.IOR, they can all be manipulated from the CX-Programmer. (BKUPIOR.IOR files cannot be manipulated.)

I/O memory		Backup	Restore	Compare	File name	Extension
Area	Addresses					
DM Area	D00000 to D19999	Yes	Yes	No	BACKUP	.IOM
CIO Area	CIO 0000 to CIO 6143 (Includes forced status.)	Yes	--- (See note 3.)	No	BAUPIOR	.IOR
Work Area	W000 to W511 (Includes forced status.)	Yes	--- (See note 3.)	No		
Holding Area	H000 to H511	Yes	Yes	No		
Auxiliary Area	A000 to A447, A10000 to A11135	Yes	---	---		
	A448 to A1472	Yes	Yes	No		
Timer Completion Flags and Timer PVs	T0000 to T4095	Yes	--- (See note 3.)	No		
Counter Completion Flags and Counter PVs	C0000 to C4095	Yes	Yes	No		

I/O memory		Backup	Restore	Compare	File name	Extension
Area	Addresses					
DM Area	D00000 to D19999	Yes	Yes	No	BACKUPDM	.IOM
EM Area (See notes 1 and 2.)	E□_0 to E□_32767 (□: Bank No. 0 to 18. The maximum bank number depends on the CPU Unit model.)	Yes	Yes	No	BKUPEM□	.IOM
EM Area (forced status) (See note 4.)	Only when bits are force-set/reset in automatically allocated areas.	Yes	Yes	No	BKUPEF□	.IOM

Note 1 If the number of banks in the EM data on the Memory Card is less than the number of EM banks in the CPU Unit where the data is to be restored (e.g., if data backed up by the CJ2H-CPU64-EIP is to be restored at the CJ2H-CPU68-EIP), the amount of EM data on the Memory Card will be restored. On the other hand, if the number of banks in the EM data on the Memory Card is greater than the number of EM banks in the CPU Unit where the data is to be restored (e.g., if data backed up by the CJ2H-CPU68-EIP is to be restored at the CJ2H-CPU64-EIP), it will not be possible to restore the data.

2 When the EM file memory function is used, the EM file memory will be restored only if the backup data is restored to a CPU Unit of the same model. If it is restored to a CPU Unit of a different model, the data will not function as EM file memory.

3 The BKUPIOR.IOR file will be cleared when data is restored from the Memory Card at startup. If, however, the IOM Hold Bit (A500.12) is ON and the IOM Hold Bit Startup Hold Setting in the PLC Setup is set to hold the setting of the IOM Hold Bit, the CIO and Work Area data and Timer Completion Flags and PVs will be held without being cleared from the Memory Card at startup.

4 If the Forced Status Hold Bit (A500.13) is ON and the Forced Status Hold Bit Startup Hold Setting in the PLC Setup is set to hold the setting of the Forced Status Hold Bit, the forced status will be held without being cleared when restored from the Memory Card at startup, to a CPU Unit of the same model. If the data is restored to a CPU Unit of a different model, the status will not be held.

Unit Backup Data

When CPU Bus or Special I/O Units that support the simple backup function are connected to the CPU Unit, the data in the CPU Bus or Special I/O Units will also be backed up by the simple backup operation. Data in the CPU Bus and Special I/O Units is backed up separately for each Unit.

Contents	Backup	Restore	Compare	File name	Extension
Data in Unit with unit address □□ (The contents depend on the Unit.)	Yes	Yes	Yes	BACKUP□□	.PRM

Note If the file does not exist when restoring data from the Memory Card to I/O memory, an error will not occur at the CPU Unit but the data will not be restored to the CPU Bus or Special I/O Unit and an error will occur at the CPU Bus or Special I/O Unit. For details on errors that occur at a CPU Bus or Special I/O Unit, refer to the operation manual for the specific Unit.

Data in individual Units is saved to the Memory Card under the following file names.

File name: BACKUP□□.PRM

Unit address of Unit/Board (hex)

Note The unit address is determined as follows:

- Built-in EtherNet/IP (CJ2H-CPU□□-EIP) or CPU Bus Unit: Unit number + 10 hex
- Special I/O Unit: Unit number + 20 hex

In order for data in a Unit to be backed up, that Unit must support the simple backup function. Refer to the operation manual for the specific Unit to check whether this function is supported.

Applicable Units	Model numbers	Data backed up for simple backup	Data capacity used in Memory Card
Serial Communications Units	CJ1W-SCU21 CJ1W-SCU41 CJ1W-SCU21-V1 CJ1W-SCU31-V1 CJ1W-SCU41-V1	Protocol macro data (Including both standard system protocols and user-defined protocols from the flash memory in the Unit or Board)	129 Kbytes
FL-net Units	CJ1W-FLN22	Data link tables	1.3 Kbytes
DeviceNet Units	CJ1W-DRM21	Device parameters (all data in EEPROM in the Unit) (Although this is the same data as is backed up from the Memory Card backup function supported by the Unit or the DeviceNet Configuration (Ver. 2.□), there is no file compatibility.)	7 Kbytes
CompoNet Units	CJ1W-CRM21	• Registration tables • Software settings • Network parameters • Slave parameters	3.5 Kbytes
Motion Control Units	CJ1W-MCH71	• Positioning data • System parameters • G-language programming	8,192 Kbytes
Position Control Units	CJ1W-NCF71	• Common parameters • Individual axis parameters	64 Kbytes
	CJ1W-NC113/133/213/233/413/433	• Axis parameters • Sequence data • Speed data • Acceleration/deceleration time data • Dual timer data • Zone data	7 Kbytes
EtherNet/IP Unit	CJ1W-EIP21	• Unit settings • Tag data link settings	459 Kbytes

Precautions for Correct Use

When using a simple backup file to restore data, use a CPU Unit of the same model as the backup source. If a CPU Unit of a different model is used, the following operations will result.

- If the number of EM banks for the simple backup file is greater than that of the CPU Unit where the data is to be restored, the data will not be restored.
- If the number of EM banks for the simple backup file is less than that of the CPU Unit where the data is to be restored, the data in the EM bank areas in the simple backup file will be restored, but forced status will not be restored. In addition, EM banks that are not in the simple backup file will retain their values from before the restoration.

App

Appendices

The appendices provide Unit specifications, Unit dimensions, details on fatal and non-fatal errors, information on connecting to serial ports on the CPU Unit, the procedure for installing the USB driver on a personal computer, and information on load short-circuit protection and line disconnection detection.

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A-7 Relay Output Noise Reduction Methods A-119

A-1 Specifications of Basic I/O Units

A-1-1 Overview of Units

Basic I/O Units

● Basic Input Units

Type of Unit	Name	Specifications		Model	Page
Basic Input Units	DC Input Units	Terminal block, 12 to 24 VDC	8 inputs	CJ1W-ID201*1	A-4
		Terminal block, 24 VDC,	16 inputs	CJ1W-ID211	A-5
		Fujitsu-compatible connector, 24 VDC	32 inputs	CJ1W-ID231	A-6
		MIL connector, 24 VDC	32 inputs	CJ1W-ID232	A-7
		Fujitsu-compatible connector, 24 VDC	64 inputs	CJ1W-ID261	A-8
		MIL connector, 24 VDC	64 inputs	CJ1W-ID262	A-10
	AC Input Units	Terminal block, 200 to 240 VAC	8 inputs	CJ1W-IA201*1	A-11
		Terminal block, 100 to 120 VAC	16 inputs	CJ1W-IA111	A-13
	Interrupt Input Unit	Terminal block, 24 VDC	16 inputs	CJ1W-INT01	A-14
	Quick-response Input Unit	Terminal block, 24 VDC	16 inputs	CJ1W-IDP01	A-15

*1 Although 16 I/O bits (1 word) are allocated, only 8 of these can be used for external I/O. This Unit is also treated as a 16-point I/O Unit in the I/O tables.

● Basic Output Units

Type of Unit	Name		Specifications		Model	Page
Basic Output Units	Relay Output Units		Terminal block, 250 VAC/24 VDC, 2 A, 8 independent contacts	8 outputs	CJ1W-OC201*1	A-17
			Terminal block, 250 VAC/24 VDC, 2 A	16 outputs	CJ1W-OC211	A-18
	Triac Output Unit		Terminal block, 250 VAC, 0.6 A/24 VDC,	8 outputs	CJ1W-OA201*1	A-19
	Transistor Output Units	Sinking outputs	Terminal block, 12 to 24 VDC, 2 A	8 outputs	CJ1W-OD201*1	A-20
			Terminal block, 12 to 24 VDC, 0.5 A	8 outputs	CJ1W-OD203*1	A-21
			Terminal block, 12 to 24 VDC, 0.5 A	16 outputs	CJ1W-OD211	A-22
			Fujitsu-compatible connector, 12 to 24 VDC, 0.5 A	32 outputs	CJ1W-OD231	A-23
			MIL connector, 12 to 24 VDC, 0.5 A	32 outputs	CJ1W-OD233	A-25
			Fujitsu-compatible connector, 12 to 24 VDC, 0.3 A	64 outputs	CJ1W-OD261	A-27
			MIL connector, 12 to 24 VDC, 0.3 A	64 outputs	CJ1W-OD263	A-29
		Sourcing outputs	Terminal block, 24 VDC, 2 A, load short-circuit protection, line disconnection detection	8 outputs	CJ1W-OD202*1	A-31
			Terminal block, 24 VDC, 0.5 A, load short-circuit protection	8 outputs	CJ1W-OD204*1	A-33
			Terminal block, 24 VDC, 0.5 A, load short-circuit protection	16 outputs	CJ1W-OD212	A-34
			MIL connector, 24 VDC, 0.5 A, load short-circuit protection	32 outputs	CJ1W-OD232	A-35
			MIL connector, 12 to 24 VDC, 0.3 A	64 outputs	CJ1W-OD262	A-37

*1 Although 16 I/O bits (1 word) are allocated, only 8 of these can be used for external I/O. This Unit is also treated as a 16-point I/O Unit in the I/O tables.

● Basic Mixed I/O Units

Type of Unit	Name		Specifications		Model	Page
Mixed I/O Units	24-VDC Inputs/Transistor Output Units	Sinking output	Fujitsu-compatible connector Inputs: 24 VDC Outputs: 12 to 24 VDC, 0.5 A, sinking	16 inputs 16 outputs	CJ1W-MD231	A-39
			MIL connector Inputs: 24 VDC Outputs: 12 to 24 VDC, 0.5 A, sinking		CJ1W-MD233	A-41
			Fujitsu-compatible connector Inputs: 24 VDC Outputs: 12 to 24 VDC, 0.3 A, sinking	32 inputs 32 outputs	CJ1W-MD261	A-43
			MIL connector Inputs: 24 VDC Outputs: 12 to 24 VDC, 0.3 A, sinking		CJ1W-MD263	A-45
		Sourcing output	MIL connector Input: 24 VDC Outputs: 24 VDC, 0.5 A, load short-circuit protection	16 inputs 16 outputs	CJ1W-MD232	A-47
	TTL I/O Units		Inputs: 5 VDC Outputs: 5 VDC, 35 mA	32 inputs 32 outputs	CJ1W-MD563	A-49
	Precautions on Contact Output Units					A-51
	Load short-circuit protection and line disconnection detection for CJ1W-OD202					A-115
	Load short-circuit protection for CJ1W-OD204/OD212/OD232/MD232					A-117

Note For details on the connectors included with the Unit, refer to the information provided under Accessories in the tables for *Basic I/O Units* in the following pages.

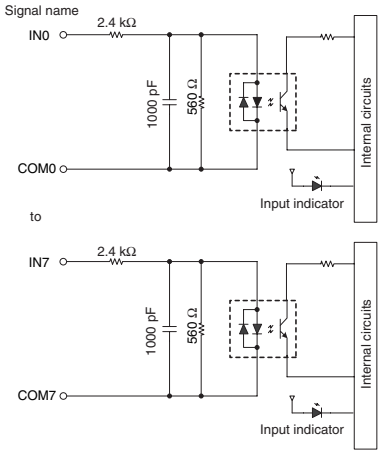
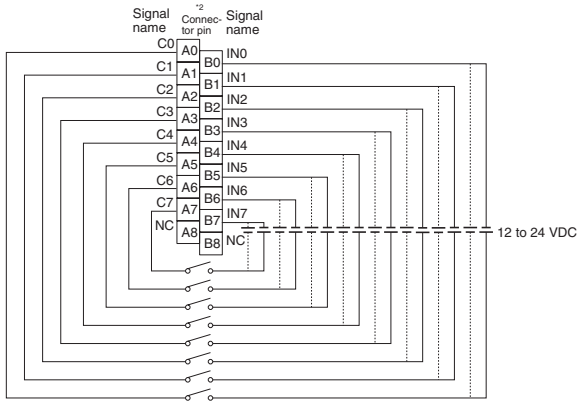
Reading Terminal Connection Diagrams

- I/O terminals in terminal connection diagrams are shown as viewed from the front panel of the Unit.
- Terminal numbers A0 to A9 and B0 to B9 are used in this manual, but they are not printed on all Units.
- A0 to A20 and B0 to B20 are printed on the Units.

A-1-2 Basic I/O Units

Basic Input Units with Terminal Blocks

● CJ1W-ID201 DC Input Unit (12 to 24-VDC, 8 Points)

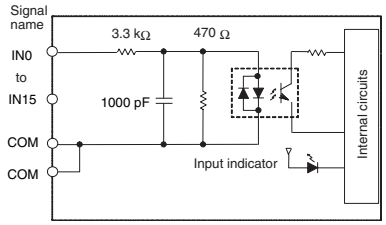
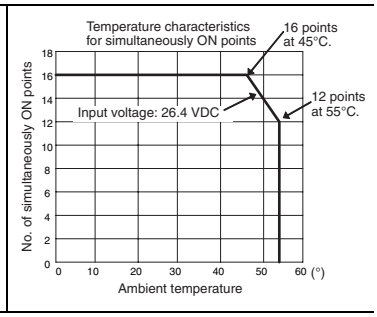
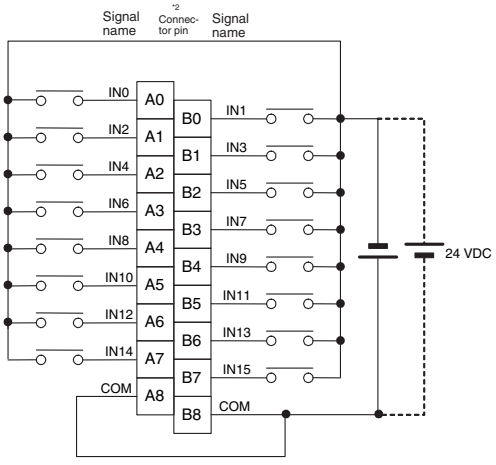
Name	8-point DC Input Unit with Terminal Block
Model	CJ1W-ID201
Rated Input Voltage	12 to 24 VDC
Rated Input Voltage Range	10.2 to 26.4 VDC
Input Impedance	2.4 kΩ
Input Current	10 mA typical (at 24 VDC)
ON Voltage/ON Current	8.8 VDC min./3 mA min.
OFF Voltage/OFF Current	3 VDC max./1 mA max.
ON Response Time	8.0 ms max. (Can be set to between 0 and 32 ms in the PLC Setup.)*1
OFF Response Time	8.0 ms max. (Can be set to between 0 and 32 ms using PLC Setup)*1
Number of Circuits	8 independent circuits
Number of Simultaneously ON Points	100% simultaneously ON
Insulation Resistance	20 MΩ between external terminals and the GR terminal (100 VDC)
Dielectric Strength	1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Internal Current Consumption	80 mA max.
Weight	110 g max.
Circuit Configuration	
Terminal Connections	 Polarity of the input power supply can be connected in either direction.

*1 The ON response time will be 20 μs maximum and OFF response time will be 400 μs maximum even if the response time are set to 0 ms due to internal element delays.

*2 Terminal numbers A0 to A8 and B0 to B8 are used in this manual, but they are not printed on the Unit.

Note Although 16 I/O bits (1 word) are allocated, only 8 of these can be used for external I/O. This Unit is also treated as a 16-point I/O Unit in the I/O tables.

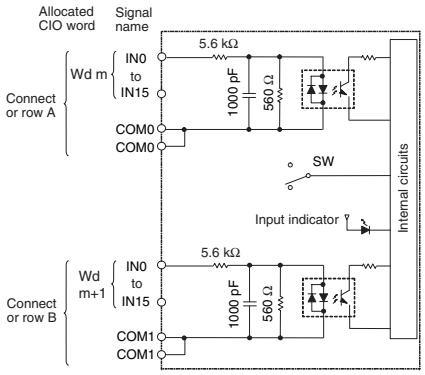
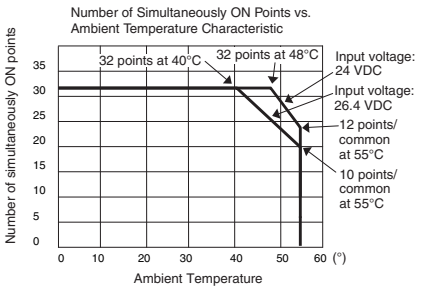
● CJ1W-ID211 DC Input Unit (24 VDC, 16 Points)

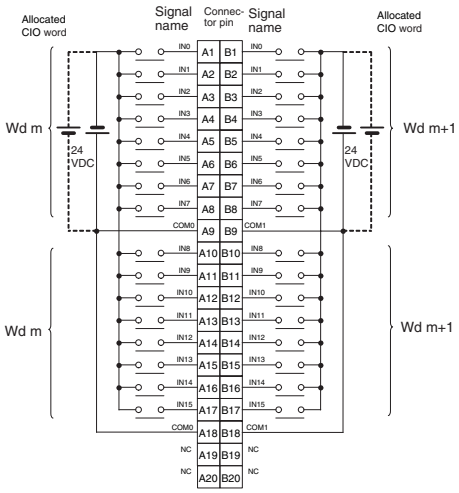
Name	16-point DC Input Unit with Terminal Block
Model	CJ1W-ID211
Rated Input Voltage	24 VDC
Rated Input Voltage Range	20.4 to 26.4 VDC
Input Impedance	3.3 kΩ
Input Current	7 mA typical (at 24 VDC)
ON Voltage/ON Current	14.4 VDC min./3 mA min.
OFF Voltage/OFF Current	5 VDC max./1 mA max.
ON Response Time	8.0 ms max. (Can be set to between 0 and 32 ms in the PLC Setup.)*1
OFF Response Time	8.0 ms max. (Can be set to between 0 and 32 ms using PLC Setup)*1
Number of Circuits	16 (16 points/common, 1 circuit)
Number of Simultaneously ON Points	100% simultaneously ON (at 24 VDC) (Refer to the following illustration.)
Insulation Resistance	20 MΩ between external terminals and the GR terminal (100 VDC)
Dielectric Strength	1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Internal Current Consumption	80 mA max.
Weight	110 g max.
Circuit Configuration	 
Terminal Connections	 • Polarity of the input power supply can be connected in either direction.

*1 The ON response time will be 20 μs maximum and OFF response time will be 400 μs maximum even if the response time are set to 0 ms due to internal element delays.

*2 Terminal numbers A0 to A8 and B0 to B8 are used in this manual, but they are not printed on the Unit.

● CJ1W-ID231 DC Input Unit (24 VDC, 32 Points)

Name	32-point DC Input Unit with Fujitsu Connector
Model	CJ1W-ID231
Rated Input Voltage	24 VDC
Rated Input Voltage Range	20.4 to 26.4 VDC
Input Impedance	5.6 kΩ
Input Current	4.1 mA typical (at 24 VDC)
ON Voltage/ON Current	19.0 VDC min./3 mA min.
OFF Voltage/OFF Current	5 VDC max./1 mA max.
ON Response Time	8.0 ms max. (Can be set to between 0 and 32 in the PLC Setup.)*1
OFF Response Time	8.0 ms max. (Can be set to between 0 and 32 in the PLC Setup.)*1
Number of Circuits	32 (16 points/common, 2 circuits)
Number of Simultaneously ON Points	75% (12 points/common) simultaneously ON (at 24 VDC) (Refer to the following illustration.)
Insulation Resistance	20 MΩ between external terminals and the GR terminal (100 VDC)
Dielectric Strength	1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Internal Current Consumption	90 mA max.
Weight	70 g max.
Accessories	None
Circuit Configuration	 

Terminal Connections	 • The input power polarity can be connected in either direction. • Be sure to wire both pins A9 and A18 (COM0), and set the same polarity for both pins. • Be sure to wire both pins B9 and B18 (COM1), and set the same polarity for both pins.

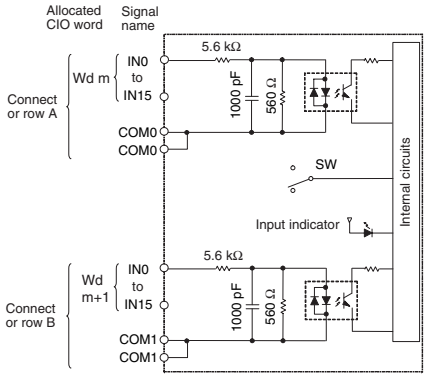
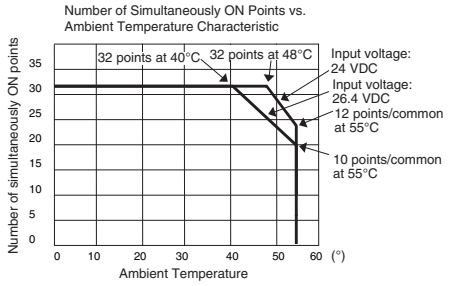
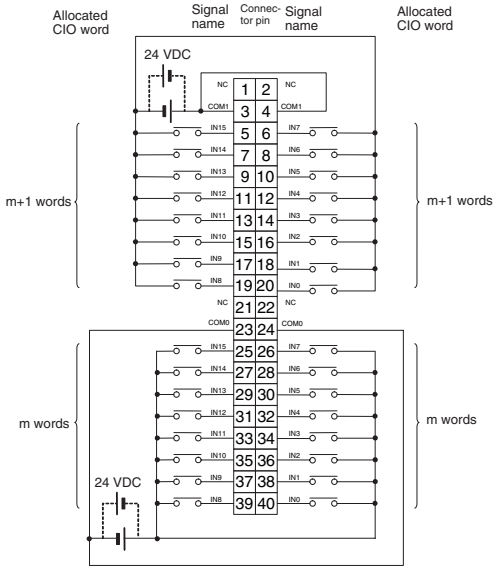
*1 The ON response time will be 20 μs maximum and OFF response time will be 400 μs maximum even if the response times are set to 0 ms due to internal element delays.

Note Observe the following restrictions when connecting to a 2-wire sensor.

- Make sure the input power supply voltage does not exceed the ON voltage (19 V) plus the residual voltage of the sensor (approx. 3 V).
- Use a sensor with a minimum load current of 3 mA min.
- Connect bleeder resistance if you connect a sensor with a minimum load current of 5 mA or higher.

● CJ1W-ID232 DC Input Unit (24 VDC, 32 Points)

Name	32-point DC Input Unit with MIL Connector
Model	CJ1W-ID232
Rated Input Voltage	24 VDC
Rated Input Voltage Range	20.4 to 26.4 VDC
Input Impedance	5.6 kΩ
Input Current	4.1 mA typical (at 24 VDC)
ON Voltage/ON Current	19.0 VDC min./3 mA min.
OFF Voltage/OFF Current	5 VDC max./1 mA max.
ON Response Time	8.0 ms max. (Can be set to between 0 and 32 in the PLC Setup.)*1
OFF Response Time	8.0 ms max. (Can be set to between 0 and 32 in the PLC Setup.) *1
Number of Circuits	32 (16 points/common, 2 circuits)
Number of Simultaneously ON Points	75% (12 points/common) simultaneously ON (at 24 VDC) (Refer to the following illustration.)
Insulation Resistance	20 MΩ between external terminals and the GR terminal (100 VDC)
Dielectric Strength	1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Internal Current Consumption	90 mA max.
Weight	70 g max.
Accessories	None

Circuit Configuration	 
Terminal Connections	 • The input power polarity can be connected in either direction. • Be sure to wire both pins 23 and 24 (COM0), and set the same polarity for both pins. • Be sure to wire both pins 3 and 4 (COM1), and set the same polarity for both pins.

*1 The ON response time will be 20 μs maximum and OFF response time will be 400 μs maximum even if the response times are set to 0 ms due to internal element delays.

Note Observe the following restrictions when connecting to a 2-wire sensor.

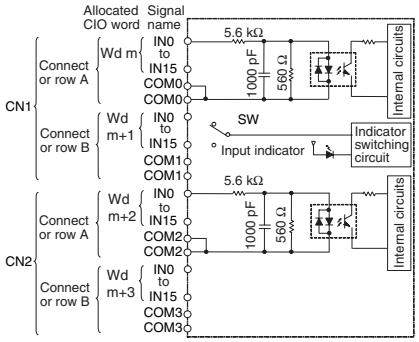
- Make sure the input power supply voltage does not exceed the ON voltage (19 V) plus the residual voltage of the sensor (approx. 3 V).
- Use a sensor with a minimum load current of 3 mA min.
- Connect bleeder resistance if you connect a sensor with a minimum load current of 5 mA or higher.

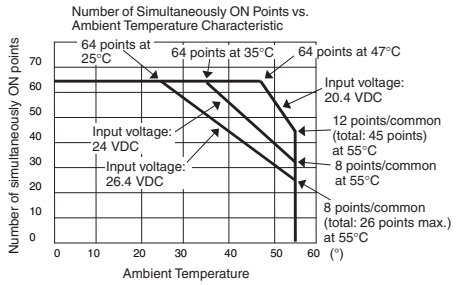
● CJ1W-ID261 DC Input Unit (24 VDC, 64 Points)

Name	64-point DC Input Unit with Fujitsu Connector
Model	CJ1W-ID261
Rated Input Voltage	24 VDC
Rated Input Voltage Range	20.4 to 26.4 VDC
Input Impedance	5.6 kΩ
Input Current	4.1 mA typical (at 24 VDC)
ON Voltage/ON Current	19.0 VDC min./3 mA min.
OFF Voltage/OFF Current	5 VDC max./1 mA max.

ON Response Time	8.0 ms max. (Can be set to between 0 and 32 in the PLC Setup.)*1
OFF Response Time	8.0 ms max. (Can be set to between 0 and 32 in the PLC Setup.)*1
Number of Circuits	64 (16 points/common, 4 circuits)
Number of Simultaneously ON Points	50% (16 points/common) simultaneously ON (at 24 VDC) (Refer to the following illustrations.)
Insulation Resistance	20 MΩ between external terminals and the GR terminal (100 VDC)
Dielectric Strength	1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Internal Current Consumption	90 mA max.
Weight	110 g max.
Accessories	None

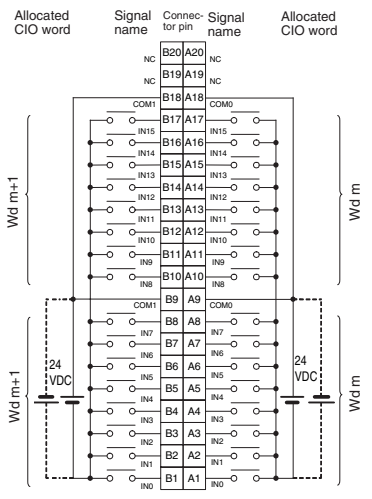
Circuit Configuration




Number of Simultaneously ON Points vs. Ambient Temperature Characteristic
Number of simultaneously ON points
Ambient Temperature
64 points at 25°C
64 points at 35°C
64 points at 47°C
Input voltage: 20.4 VDC
Input voltage: 24 VDC
Input voltage: 26.4 VDC
12 points/common (total: 45 points) at 55°C
8 points/common at 55°C
8 points/common (total: 26 points max.) at 55°C

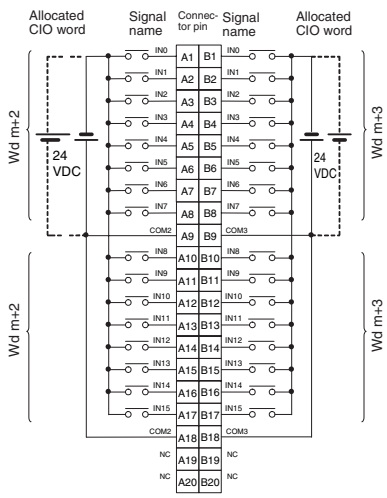
Terminal Connections

CN1



- The input power polarity can be connected in either direction.
- Be sure to wire both pins A9 and A18 (COM0) of CN1, and set the same polarity for both pins.
- Be sure to wire both pins B9 and B18 (COM1) of CN1, and set the same polarity for both pins.

CN2



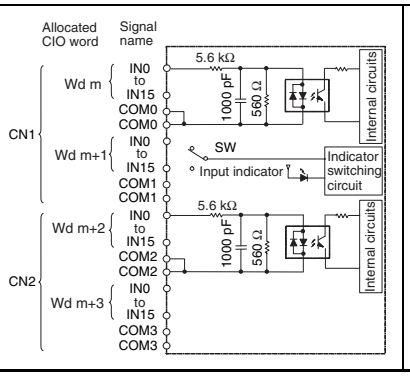
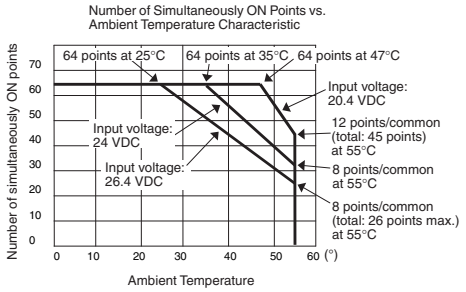
- The input power polarity can be connected in either direction.
- Be sure to wire both pins A9 and A18 (COM2) of CN2, and set the same polarity for both pins.
- Be sure to wire both pins B9 and B18 (COM3) of CN2, and set the same polarity for both pins.

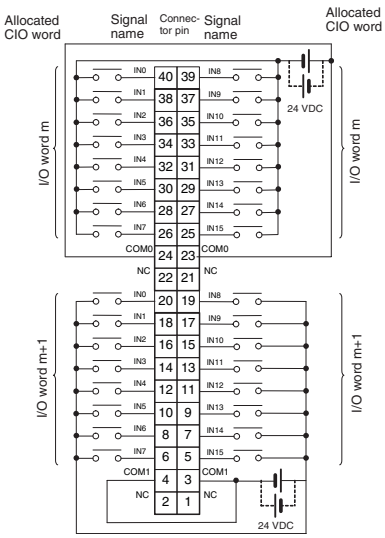
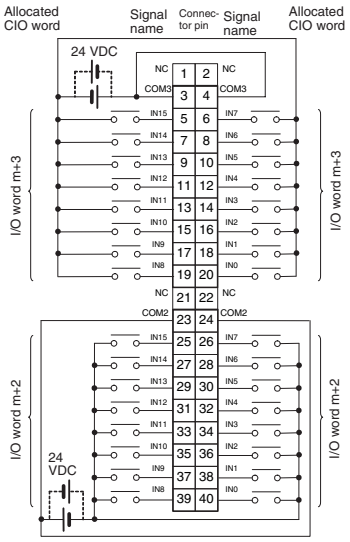
*1 The ON response time will be 20 μs maximum and OFF response time will be 400 μs maximum even if the response times are set to 0 ms due to internal element delays.

Note Observe the following restrictions when connecting to a 2-wire sensor.

- Make sure the input power supply voltage does not exceed the ON voltage (19 V) plus the residual voltage of the sensor (approx. 3 V).
- Use a sensor with a minimum load current of 3 mA min.
- Connect bleeder resistance if you connect a sensor with a minimum load current of 5 mA or higher.

● CJ1W-ID262 DC Input Unit (24 VDC, 64 Points)

Name	64-point DC Input Unit with MIL Connector
Model	CJ1W-ID262
Rated Input Voltage	24 VDC
Rated Input Voltage Range	20.4 to 26.4 VDC
Input Impedance	5.6 kΩ
Input Current	4.1 mA typical (at 24 VDC)
ON Voltage/ON Current	19.0 VDC min./3 mA min.
OFF Voltage/OFF Current	5 VDC max./1 mA max.
ON Response Time	8.0 ms max. (Can be set to between 0 and 32 in the PLC Setup.)*1
OFF Response Time	8.0 ms max. (Can be set to between 0 and 32 in the PLC Setup.)*1
Number of Circuits	64 (16 points/common, 4 circuits)
Number of Simultaneously ON Points	50% (8 points/common) simultaneously ON (at 24 VDC) (Refer to the following illustrations.)
Insulation Resistance	20 MΩ between external terminals and the GR terminal (100 VDC)
Dielectric Strength	1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Internal Current Consumption	90 mA max.
Weight	110 g max.
Accessories	None
Circuit Configuration	 

	CN1	CN2
Terminal Connections	 • The input power polarity can be connected in either direction. • Be sure to wire both pins 23 and 24 (COM0) of CN1, and set the same polarity for both pins. • Be sure to wire both pins 3 and 4 (COM1) of CN1, and set the same polarity for both pins.	 • The input power polarity can be connected in either direction. • Be sure to wire both pins 23 and 24 (COM2) of CN2, and set the same polarity for both pins. • Be sure to wire both pins 3 and 4 (COM3) of CN2, and set the same polarity for both pins.

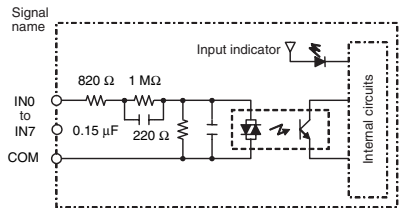
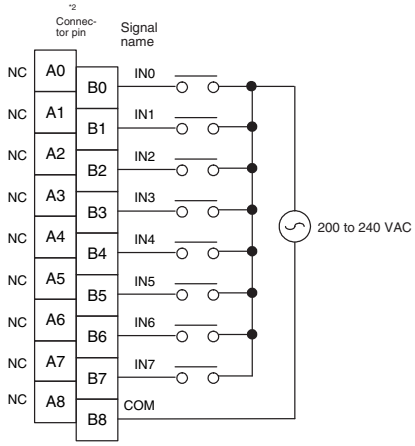
*1 The ON response time will be 20 μs maximum and OFF response time will be 400 μs maximum even if the response times are set to 0 ms due to internal element delays.

Note Observe the following restrictions when connecting to a 2-wire sensor.

- Make sure the input power supply voltage does not exceed the ON voltage (19 V) plus the residual voltage of the sensor (approx. 3 V).
- Use a sensor with a minimum load current of 3 mA min.
- Connect bleeder resistance if you connect a sensor with a minimum load current of 5 mA or higher.

● CJ1W-IA201 AC Input Unit (200 VAC, 8 Points)

Name	8-point AC Input Unit with Terminal Block
Model	CJ1W-IA201
Rated Input Voltage	200 to 240 VAC 50/60 Hz
Rated Input Voltage Range	170 to 264 VAC
Input Impedance	21 kΩ (50 Hz), 18 kΩ (60 Hz)
Input Current	9 mA typical (at 200 VAC, 50 Hz), 11 mA typical (at 200 VAC, 60 Hz)
ON Voltage/ON Current	120 VAC min./4 mA min.
OFF Voltage/OFF Current	40 VAC max./2 mA max.
ON Response Time	18.0 ms max. (PLC Setup default setting: 8 ms)*1
OFF Response Time	48.0 ms max. (PLC Setup default setting: 8 ms)*1
Number of Circuits	8 (8 points/common, 1 circuit)
Number of Simultaneously ON Points	100% (8 points/common) simultaneously ON
Insulation Resistance	20 MΩ between external terminals and the GR terminal (500 VDC)
Dielectric Strength	2,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Internal Current Consumption	80 mA max.

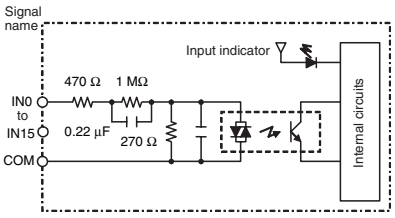
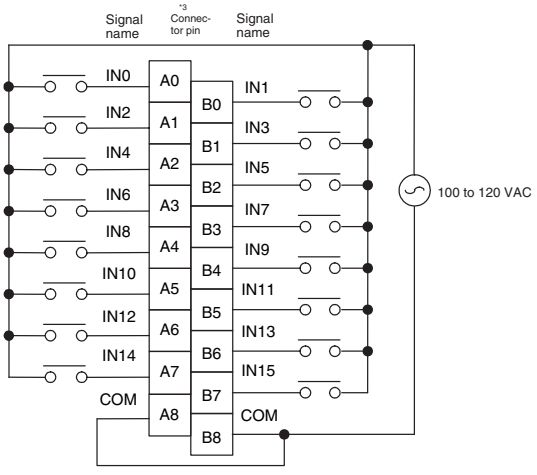
Weight	130 g max.
Accessories	None
Circuit Configuration	
Terminal Connections	

*1 The Input ON and OFF response times for Basic I/O Units can be set to 0 ms, 0.5 ms, 1 ms, 2 ms, 4 ms, 8 ms, 16 ms, or 32 ms in the PLC Setup. When the response times have been set to 0 ms, the ON response time will be 10 ms maximum and the OFF response time will be 40 ms maximum due to internal element delays.

*2 Terminal numbers A0 to A8 and B0 to B8 are used in this manual, but they are not printed on the Unit.

Note Although 16 I/O bits (1 word) are allocated, only 8 of these can be used for external I/O. This Unit is also treated as a 16-point I/O Unit in the I/O tables.

● CJ1W-IA111 AC Input Unit (100 VAC, 16 points)

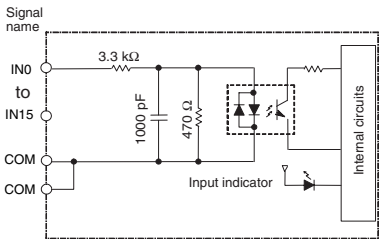
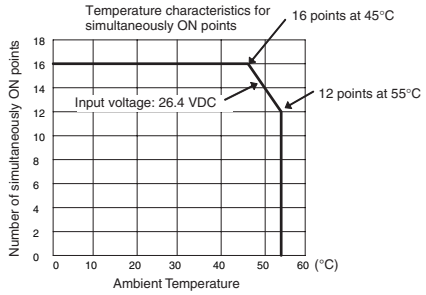
Name	16-point AC Input Unit with Terminal Block
Model	CJ1W-IA111
Rated input voltage	100 to 120 VAC 50/60 Hz*2
Rated Input Voltage Range	85 to 132 VAC
Input Impedance	14.5 kΩ (50 Hz), 12 kΩ (60 Hz)
Input Current	7 mA typical (at 100 VAC, 50 Hz), 8 mA typical (at 100 VAC, 60 Hz)
ON Voltage/ON Current	70 VAC min./4 mA min
OFF Voltage/OFF Current	20 VAC max./2 mA max
ON Response Time	18 ms max. (PLC Setup default setting: 8 ms)*1
OFF Response Time	48 ms max. (PLC Setup default setting: 8 ms)*1
Number of Circuits	16 (16 points/common, 1 circuit)
Number of Inputs ON Simultaneously	100% simultaneously ON (16 points/common)
Insulation Resistance	20 MΩ between external terminals and the GR terminal (500 VDC)
Dielectric Strength	2,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Internal Current Consumption	90 mA max.
Weight	130 g max.
Accessories	None
Circuit Layout	
Terminal Connections	

*1 The Input ON and OFF response times for Basic I/O Units can be set to 0 ms, 0.5 ms, 1 ms, 2 ms, 4 ms, 8 ms, 16 ms, or 32 ms in the PLC Setup. When the response times have been set to 0 ms, the ON response time will be 10 ms maximum and the OFF response time will be 40 ms maximum due to internal element delays.

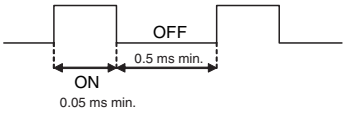
*2 Use an input voltage of 90 VAC or higher when connecting 2-wire sensors.

*3 Terminal numbers A0 to A8 and B0 to B8 are used in this manual, but they are not printed on the Unit.

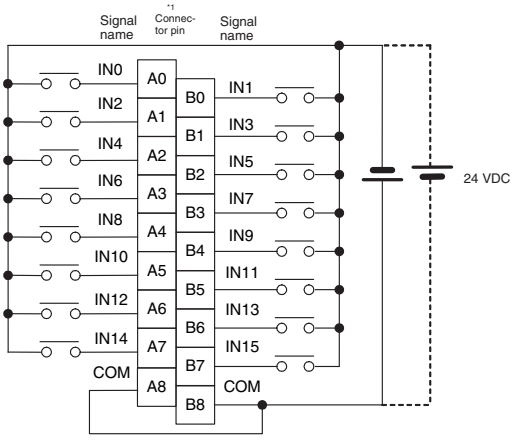
● CJ1W-INT01 Interrupt Input Unit (16 Points)

Name	16-point Interrupt Input Unit with Terminal Block
Model	CJ1W-INT01
Rated Input Voltage	24 VDC
Rated Input Voltage Range	20.4 to 26.4 VDC
Input Impedance	3.3 kΩ
Input Current	7 mA typical (at 24 VDC)
ON Voltage/ON Current	14.4 VDC min./3 mA min.
OFF Voltage/OFF Current	5 VDC max./1 mA max.
ON Response Time	0.05 ms max.
OFF Response Time	0.5 ms max.
Number of Circuits	16 (16 points/common, 1 circuit)
Number of Simultaneously ON Points	100% (16 points/common) simultaneously ON (24 VDC)
Insulation Resistance	20 MΩ between external terminals and GR terminal (at 100 VDC)
Dielectric Strength	1,000 VAC between external terminals and GR terminal for 1 minute at a leakage current of 10 mA max.
Internal Current Consumption	80 mA max.
Weight	110 g max.
Accessories	None
Circuit Configuration	 

- Up to two Interrupt Input Units can be mounted to the CPU Rack, but they must be connected as one the five Unit*1 immediately next to the CPU Unit. If an Interrupt Input Unit is connected in any other position, an I/O setting error will occur.
- Set the pulse width of signals input to the Interrupt Input Unit so they satisfy the following conditions.



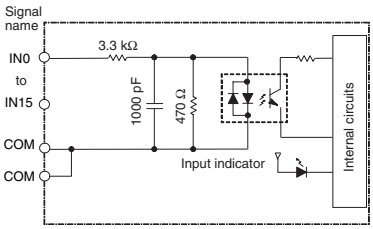
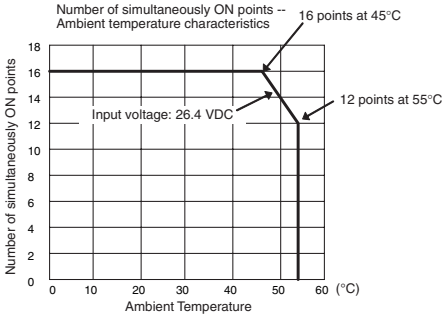
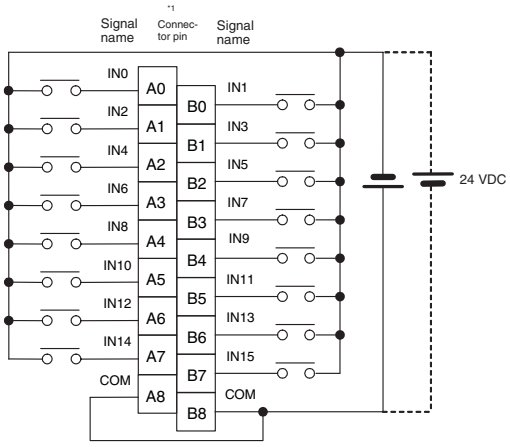
*1 With the CJ2JH-CPU6□-EIP CPU Units, the Unit must be mounted as one of the four Units immediately next to the CPU Unit.

Terminal Connections	 • The polarity can be connected in either direction.

*1 Terminal numbers A0 to A8 and B0 to B8 are used in this manual, but they are not printed on the Unit.

● CJ1W-IDP01 Quick-response Input Unit (16 Points)

Name	16-point Quick-response Input Unit with Terminal Block
Model	CJ1W-IDP01
Rated Input Voltage	24 VDC
Rated Input Voltage Range	20.4 to 26.4 VDC
Input Impedance	3.3 kΩ
Input Current	7 mA typical (at 24 VDC)
ON Voltage/ON Current	14.4 VDC min./3 mA min.
OFF Voltage/OFF Current	5 VDC max./1 mA max.
ON Response Time	0.05 ms max.
OFF Response Time	0.5 ms max.
Number of Circuits	16 (16 points/common, 1 circuit)
Number of Simultaneously ON Points	100% (16 points/common) simultaneously ON (24 VDC)
Insulation Resistance	20 MΩ between external terminals and GR terminal (at 100 VDC)
Dielectric Strength	1,000 VAC between external terminals and GR terminal for 1 minute at a leakage current of 10 mA max.
Internal Current Consumption	80 mA max.
Weight	110 g max.
Accessories	None

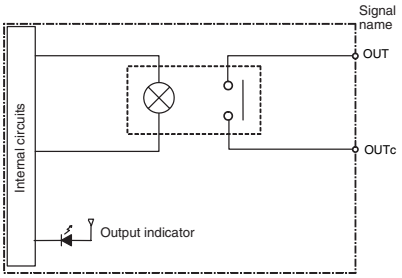
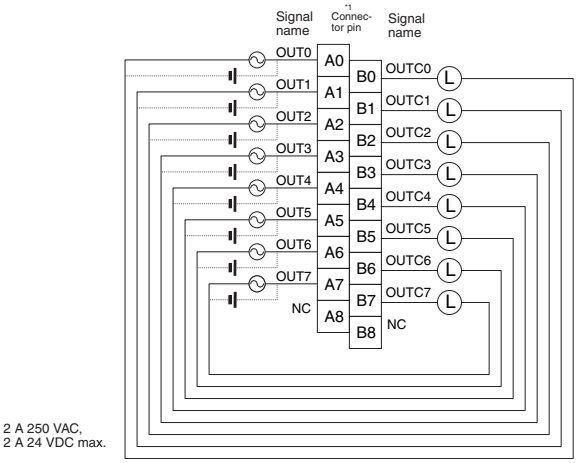
Circuit Configuration	 
Terminal Connections	 • The input power supply polarity can be connected in either direction.

- With quick-response inputs, pulse inputs shorter than the CPU Unit's cycle time can be read by the CPU Unit.
- The pulse width (ON time) that can be read by the Quick-response Input Unit is 0.05 ms.
- Inputs read by the internal circuits are cleared when inputs are refreshed.

*1 Terminal numbers A0 to A8 and B0 to B8 are used in this manual, but they are not printed on the Unit.

Basic Output Units

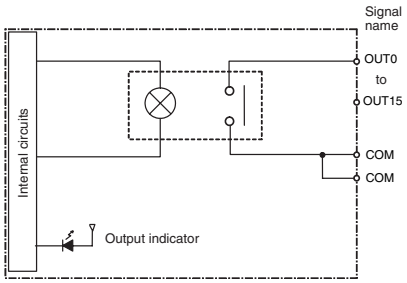
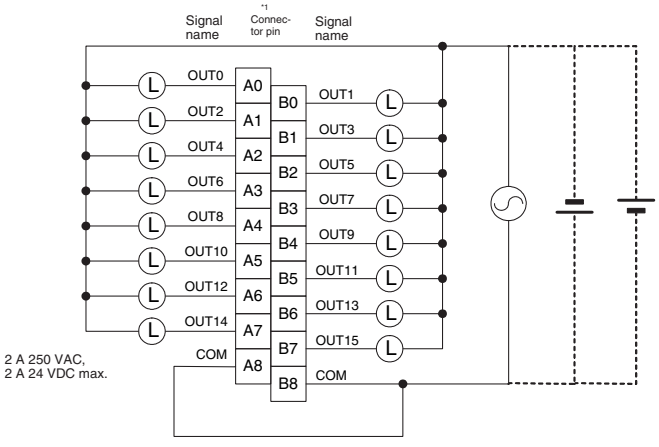
● CJ1W-OC201 Contact Output Unit (Independent Relays, 8 Points)

Name	8-point Contact Output Unit with Terminal Block (Independent Relays)
Model	CJ1W-OC201
Max. Switching Capacity	2 A 250 VAC (cosϕ = 1), 2 A 250 VAC (cosϕ = 0.4), 2 A 24 VDC (16 A/Unit)
Min. Switching Capacity	1 mA 5 VDC
Relays	NY-24W-K-IE (Fujitsu Takamizawa Components, Ltd.), Cannot be replaced.
Service Life of Relay	Electrical: 150,000 operations (24 VDC, resistive load)/ 100,000 operations (240 VAC, cosϕ = 0.4, inductive load) Mechanical: 20,000,000 operations Service life will vary depending on the connected load. Refer to page A-51 for information on service life according to the load.
ON Response Time	15 ms max.
OFF Response Time	15 ms max.
Number of Circuits	8 independent contacts
Insulation Resistance	20 MΩ between external terminals and the GR terminal (500 VDC)
Dielectric Strength	2,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Internal Current Consumption	90 mA 5 VDC max. 48 mA 24 VDC max. (6 mA × No. of ON points)
Weight	140 g max.
Circuit Configuration	
Terminal Connections	 • The input power supply polarity can be connected in either direction.

*1 Terminal numbers A0 to A8 and B0 to B8 are used in this manual, but they are not printed on the Unit.

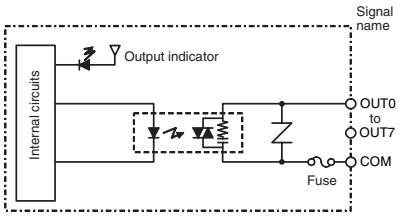
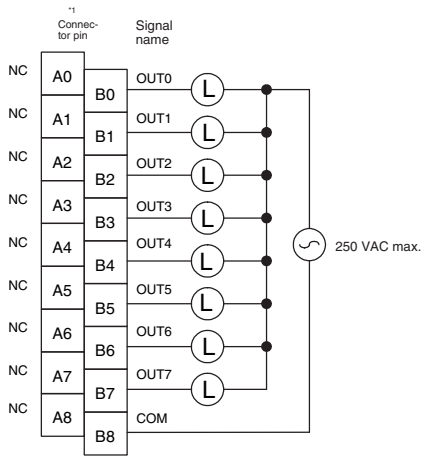
Note Although 16 I/O bits (1 word) are allocated, only 8 of these can be used for external I/O. This Unit is also treated as a 16-point I/O Unit in the I/O tables.

● CJ1W-OC211 Contact Output Unit (16 Points)

Name	16-point Contact Output Unit with Terminal Block
Model	CJ1W-OC211
Max. Switching Capacity	2 A 250 VAC (cosϕ = 1), 2 A 250 VAC (cosϕ = 0.4), 2 A 24 VDC (8 A/Unit)
Min. Switching Capacity	1 mA 5 VDC
Relays	NY-24W-K-IE (Fujitsu Takamizawa Components, Ltd.), Cannot be replaced.
Service Life of Relay	Electrical: 150,000 operations (24 VDC, resistive load)/ 100,000 operations (250 VAC, cosϕ = 0.4, inductive load) Mechanical: 20,000,000 operations Service life will vary depending on the connected load. Refer to page A-51 for information on service life according to the load.
ON Response Time	15 ms max.
OFF Response Time	15 ms max.
Number of Circuits	16 points/common, 1 circuit
Insulation Resistance	20 MΩ between external terminals and the GR terminal (500 VDC)
Dielectric Strength	2,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Internal Current Consumption	110 mA 5 VDC max. 96 mA 24 VDC max. (6 mA × No. of ON points)
Weight	170 g max.
Circuit Configuration	
Terminal Connections	

*1 Terminal numbers A0 to A8 and B0 to B8 are used in this manual, but they are not printed on the Unit.

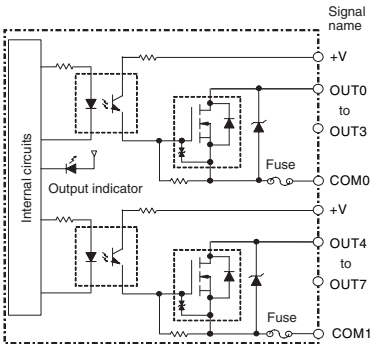
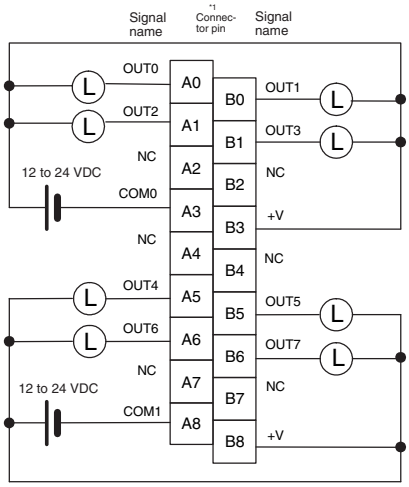
● CJ1W-OA201 Triac Output Unit (8 Points)

Name	8-point Triac Output Unit with Terminal Block
Model	CJ1W-OA201
Max. Switching Capacity	0.6 A 250 VAC, 50/60 Hz (2.4 A/Unit)
Max. Inrush Current	15 A (pulse width: 10 ms max.)
Min. Switching Capacity	50 mA 75 VAC
Leakage Current	1.5 mA (200 VAC) max.
Residual Voltage	1.6 VAC max.
ON Response Time	1 ms max.
OFF Response Time	1/2 of load frequency + 1 ms or less.
Number of Circuits	8 (8 points/common, 1 circuit)
Surge Protector	C.R Absorber + Surge Absorber
Fuses	5 A (1/common, 1 used) The fuse cannot be replaced by the user.
Insulation Resistance	20 MΩ between the external terminals and the GR terminal (500 VDC)
Dielectric Strength	2,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Internal Current Consumption	220 mA max.
Weight	150 g max.
Circuit Configuration	
Terminal Connections	

*1 Terminal numbers A0 to A8 and B0 to B8 are used in this manual, but they are not printed on the Unit.

Note Although 16 I/O bits (1 word) are allocated, only 8 of these can be used for external I/O. This Unit is also treated as a 16-point I/O Unit in the I/O tables.

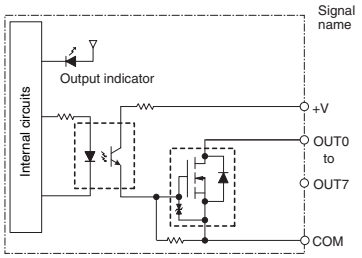
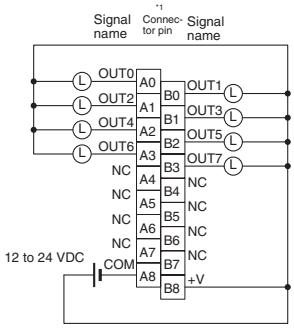
● CJ1W-OD201 Transistor Output Unit (8 Points)

Name	8-point Transistor Output Unit with Terminal Block (Sinking Outputs)
Model	CJ1W-OD201
Rated Voltage	12 to 24 VDC
Operating Load Voltage Range	10.2 to 26.4 VDC
Maximum Load Current	2.0 A/point, 8.0 A/Unit
Maximum Inrush Current	10 A/point, 10 ms max.
Leakage Current	0.1 mA max.
Residual Voltage	1.5 V max.
ON Response Time	0.5 ms max.
OFF Response Time	1.0 ms max.
Insulation Resistance	20 MΩ between the external terminals and the GR terminal (100 VDC)
Dielectric Strength	1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Number of Circuits	8 (4 points/common, 2 circuits)
Internal Current Consumption	90 mA max.
Fuse	6.3 A (1/common, 2 used) The fuse cannot be replaced by the user.
External Power Supply	12 to 24 VDC, 10 mA min.
Weight	110 g max.
Circuit Configuration	
Terminal Connections	 • When wiring, pay careful attention to the polarity of the external power supply. The load may operate incorrectly if the polarity is reversed.

*1 Terminal numbers A0 to A8 and B0 to B8 are used in this manual, but they are not printed on the Unit.

Note Although 16 I/O bits (1 word) are allocated, only 8 of these can be used for external I/O. This Unit is also treated as a 16-point I/O Unit in the I/O tables.

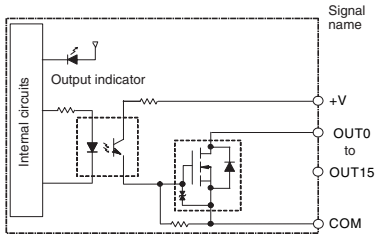
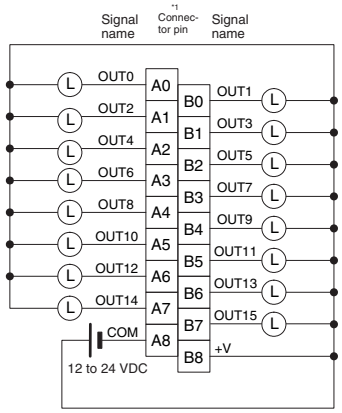
● CJ1W-OD203 Transistor Output Unit (8 Points)

Name	8-point Transistor Output Unit with Terminal Block (Sinking Outputs)
Model	CJ1W-OD203
Rated Voltage	12 to 24 VDC
Operating Load Voltage Range	10.2 to 26.4 VDC
Maximum Load Current	0.5 A/point, 4.0 A/Unit
Maximum Inrush Current	4.0 A/point, 10 ms max.
Leakage Current	0.1 mA max.
Residual Voltage	1.5 V max.
ON Response Time	0.1 ms max.
OFF Response Time	0.8 ms max.
Insulation Resistance	20 MΩ between the external terminals and the GR terminal (100 VDC)
Dielectric Strength	1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Number of Circuits	8 (8 points/common, 1 circuit)
Internal Current Consumption	100 mA max.
Fuse	None
External Power Supply	10.2 to 26.4 VDC, 20 mA min.
Weight	110 g max.
Circuit Configuration	
Terminal Connections	 • When wiring, pay careful attention to the polarity of the external power supply. The load may operate incorrectly if the polarity is reversed.

*1 Terminal numbers A0 to A8 and B0 to B8 are used in this manual, but they are not printed on the Unit.

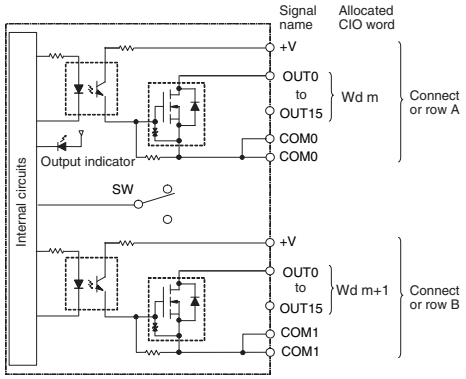
Note Although 16 I/O bits (1 word) are allocated, only 8 of these can be used for external I/O. This Unit is also treated as a 16-point I/O Unit in the I/O tables.

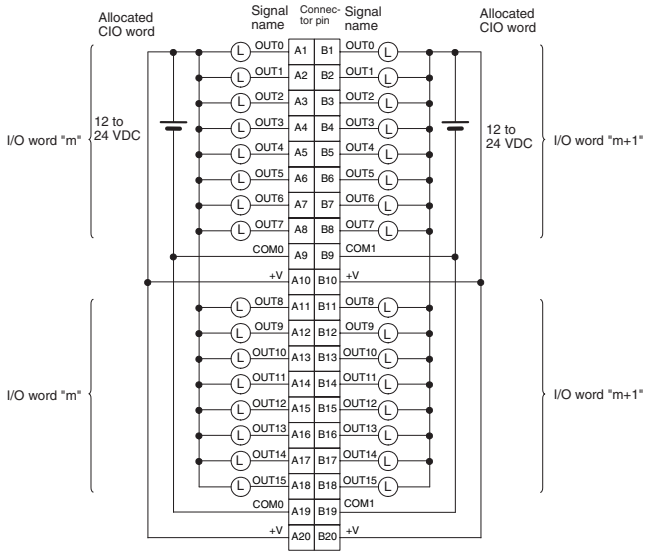
● CJ1W-OD211 Transistor Output Unit (16 Points)

Name	16-point Transistor Output Unit with Terminal Block (Sinking Outputs)
Model	CJ1W-OD211
Rated Voltage	12 to 24 VDC
Operating Load Voltage Range	10.2 to 26.4 VDC
Maximum Load Current	0.5 A/point, 5.0 A/Unit
Maximum Inrush Current	4.0 A/point, 10 ms max.
Leakage Current	0.1 mA max.
Residual Voltage	1.5 V max.
ON Response Time	0.1 ms max.
OFF Response Time	0.8 ms max.
Insulation Resistance	20 MΩ between the external terminals and the GR terminal (100 VDC)
Dielectric Strength	1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Number of Circuits	16 (16 points/common, 1 circuit)
Internal Current Consumption	5 VDC 100 mA max.
Fuse	None
External Power Supply	10.2 to 26.4 VDC, 20 mA min.
Weight	110 g max.
Circuit Configuration	
Terminal Connections	 • When wiring, pay careful attention to the polarity of the external power supply. The load may operate incorrectly if the polarity is reversed.

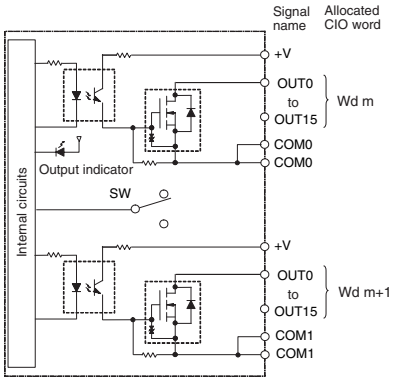
*1 Terminal numbers A0 to A8 and B0 to B8 are used in this manual, but they are not printed on the Unit.

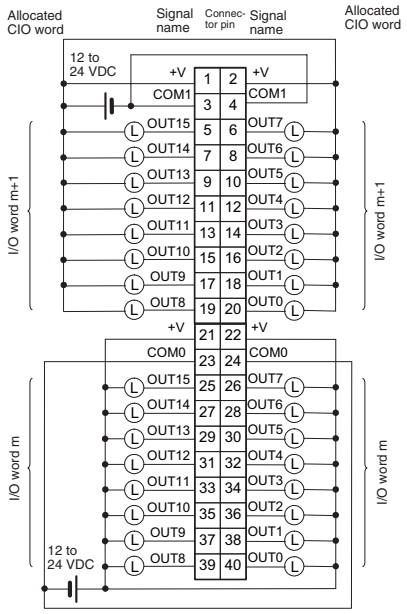
● CJ1W-OD231 Transistor Output Unit (32 Points)

Name	32-point Transistor Output Unit with Fujitsu Connector (Sinking Outputs)
Model	CJ1W-OD231
Rated Voltage	12 to 24 VDC
Operating Load Voltage Range	10.2 to 26.4 VDC
Maximum Load Current	0.5 A/point, 2.0 A/common, 4.0 A/Unit
Maximum Inrush Current	4.0 A/point, 10 ms max.
Leakage Current	0.1 mA max.
Residual Voltage	1.5 V max.
ON Response Time	0.1 ms max.
OFF Response Time	0.8 ms max.
Insulation Resistance	20 MΩ between the external terminals and the GR terminal (100 VDC)
Dielectric Strength	1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Number of Circuits	32 (16 points/common, 2 circuits)
Internal Current Consumption	5 VDC 140 mA max.
Fuse	None
External Power Supply	10.2 to 26.4 VDC, 30 mA min.
Weight	70 g max.
Accessories	None
Circuit Configuration	

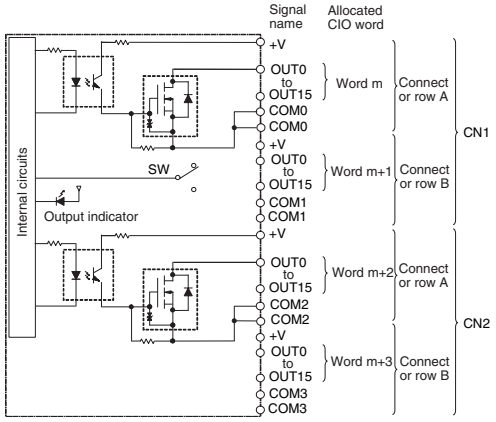
Terminal Connections	 • When wiring, pay careful attention to the polarity of the external power supply. The load may operate incorrectly if the polarity is reversed. • Be sure to wire both terminals A9 and A19 (COM0). • Be sure to wire both terminals B9 and B19 (COM1). • Be sure to wire both terminals A10 and A20 (+V). • Be sure to wire both terminals B10 and B20 (+V).

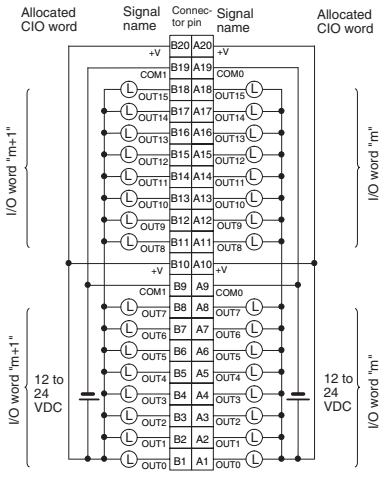
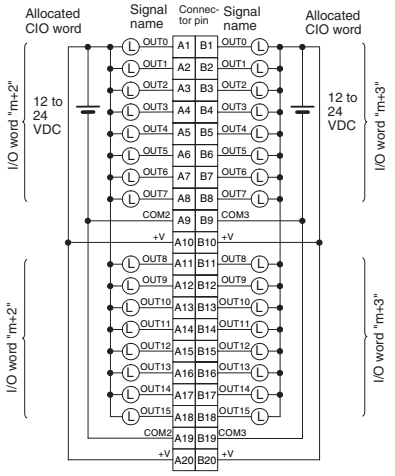
● CJ1W-OD233 Transistor Output Unit (32 Points)

Name	32-point Transistor Output Unit with MIL Connector (Sinking Outputs)
Model	CJ1W-OD233
Rated Voltage	12 to 24 VDC
Operating Load Voltage Range	10.2 to 26.4 VDC
Maximum Load Current	0.5 A/point, 2 A/common, 4 A/Unit
Maximum Inrush Current	4.0 A/point, 10 ms max.
Leakage Current	0.1 mA max.
Residual Voltage	1.5 V max.
ON Response Time	0.1 ms max.
OFF Response Time	0.8 ms max.
Insulation Resistance	20 MΩ between the external terminals and the GR terminal (100 VDC)
Dielectric Strength	1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Number of Circuits	32 (16 points/common, 2 circuits)
Internal Current Consumption	140 mA max.
Fuse	None
External Power Supply	12 to 24 VDC, 30 mA min.
Weight	70 g max.
Circuit Configuration	

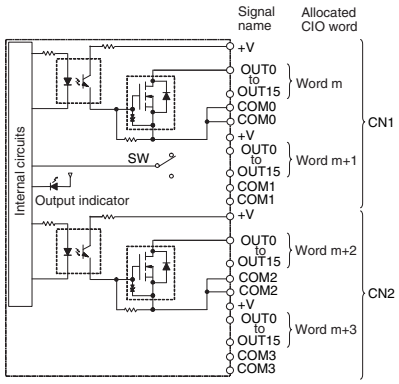
Terminal Connections	 • When wiring, pay careful attention to the polarity of the external power supply. The load may operate incorrectly if the polarity is reversed. • Be sure to wire both terminals 23 and 24 (COM0). • Be sure to wire both terminals 3 and 4 (COM1). • Be sure to wire both terminals 21 and 22 (+V). • Be sure to wire both terminals 1 and 2 (+V).

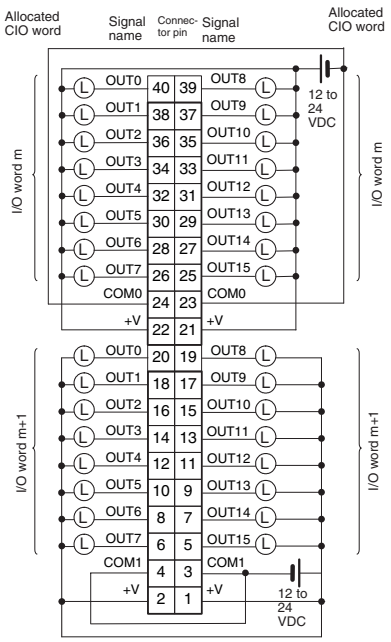
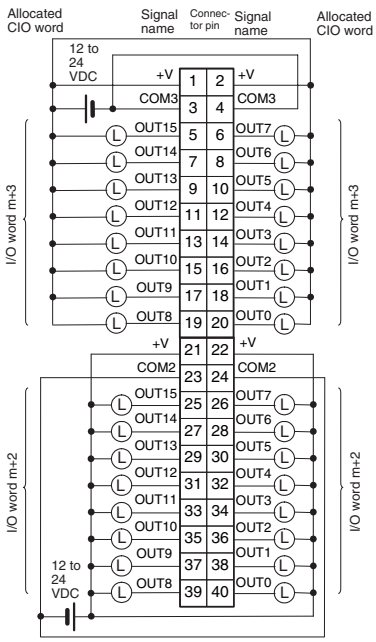
● CJ1W-OD261 Transistor Output Unit (64 Points)

Name	64-point Transistor Output Unit with Fujitsu Connectors (Sinking Outputs)
Model	CJ1W-OD261
Rated Voltage	12 to 24 VDC
Operating Load Voltage Range	10.2 to 26.4 VDC
Maximum Load Current	0.3 A/point, 1.6 A/common, 6.4 A/Unit
Maximum Inrush Current	3.0 A/point, 10 ms max.
Leakage Current	0.1 mA max.
Residual Voltage	1.5 V max.
ON Response Time	0.5 ms max.
OFF Response Time	1.0 ms max.
Insulation Resistance	20 MΩ between the external terminals and the GR terminal (100 VDC)
Dielectric Strength	1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Number of Circuits	64 (16 points/common, 4 circuits)
Internal Current Consumption	5 VDC, 170 mA max.
Fuse	None
External Power Supply	10.2 to 26.4 VDC, 50 mA min.
Weight	110 g max.
Accessories	None
Circuit Configuration	

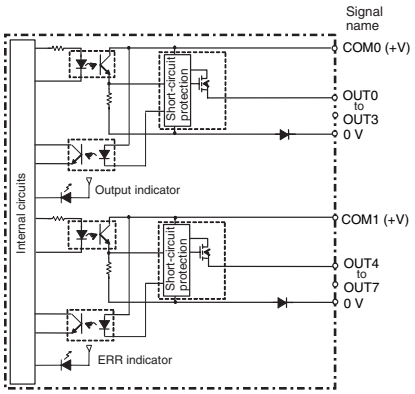
	CN1	CN2
Terminal Connections	 • When wiring, pay careful attention to the polarity of the external power supply. The load may operate incorrectly if the polarity is reversed. • Be sure to wire both terminals A9 and A19 (COM0) of CN1. • Be sure to wire both terminals B9 and B19 (COM1) of CN1. • Be sure to wire both terminals A10 and A20 (+V) of CN1. • Be sure to wire both terminals B10 and B20 (+V) of CN1.	 • When wiring, pay careful attention to the polarity of the external power supply. The load may operate incorrectly if the polarity is reversed. • Be sure to wire both terminals A9 and A19 (COM2) of CN2. • Be sure to wire both terminals B9 and B19 (COM3) of CN2. • Be sure to wire both terminals A10 and A20 (+V) of CN2. • Be sure to wire both terminals B10 and B20 (+V) of CN2.

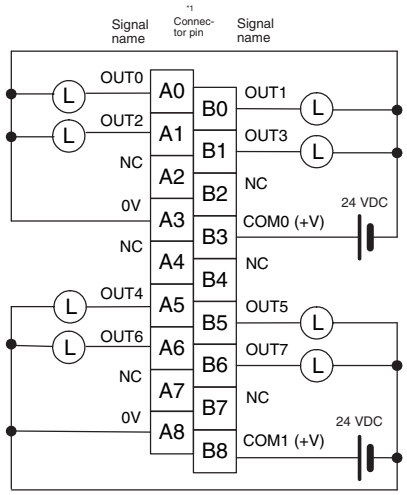
● CJ1W-OD263 Transistor Output Unit (64 Points)

Name	64-point Transistor Output Unit with MIL Connectors (Sinking Outputs)
Model	CJ1W-OD263
Rated Voltage	12 to 24 VDC
Operating Load Voltage Range	10.2 to 26.4 VDC
Maximum Load Current	0.3 A/point, 1.6 A/common, 6.4 A/Unit
Maximum Inrush Current	3.0 A/point, 10 ms max.
Leakage Current	0.1 mA max.
Residual Voltage	1.5 V max.
ON Response Time	0.5 ms max.
OFF Response Time	1.0 ms max.
Insulation Resistance	20 MΩ between the external terminals and the GR terminal (100 VDC)
Dielectric Strength	1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Number of Circuits	64 (16 points/common, 4 circuits)
Internal Current Consumption	170 mA max.
Fuse	None
External Power Supply	12 to 24 VDC, 50 mA min.
Weight	110 g max.
Circuit Configuration	

	CN1	CN2
Terminal Connections		
	• When wiring, pay careful attention to the polarity of the external power supply. The load may operate incorrectly if the polarity is reversed. • Be sure to wire both terminals 23 and 24 (COM0) of CN1. • Be sure to wire both terminals 3 and 4 (COM1) of CN1. • Be sure to wire both terminals 21 and 22 (+V) of CN1. • Be sure to wire both terminals 1 and 2 (+V) of CN1.	• When wiring, pay careful attention to the polarity of the external power supply. The load may operate incorrectly if the polarity is reversed. • Be sure to wire both terminals 23 and 24 (COM2) of CN2. • Be sure to wire both terminals 3 and 4 (COM3) of CN2. • Be sure to wire both terminals 21 and 22 (+V) of CN2. • Be sure to wire both terminals 1 and 2 (+V) of CN2.

● CJ1W-OD202 Transistor Output Unit (8 Points)

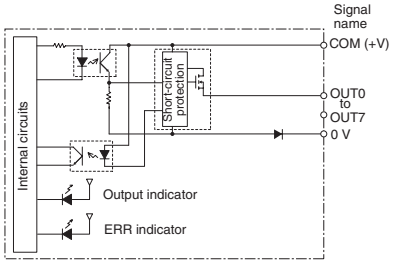
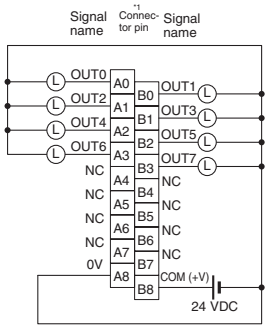
Name	8-point Transistor Output Unit with Terminal Block (Sourcing Outputs)
Model	CJ1W-OD202
Rated Voltage	24 VDC
Operating Load Voltage Range	20.4 to 26.4 VDC
Maximum Load Current	2 A/point, 8 A/Unit
Leakage Current	0.1 mA max.
Residual Voltage	1.5 V max.
ON Response Time	0.5 ms max.
OFF Response Time	1.0 ms max.
Load Short-circuit Protection	Detection current: 6 A min. Automatic restart after error clearance. (Refer to page A-115.)
Line Disconnection Detection	Detection current: 200 mA (Refer to page A-115.)
Insulation Resistance	20 MΩ between the external terminals and the GR terminal (100 VDC)
Dielectric Strength	1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Number of Circuits	8 (4 points/common, 2 circuits)
Internal Current Consumption	110 mA max.
Fuse	None
External Power Supply	24 VDC, 50 mA min.
Weight	120 g max.
Circuit Configuration	 • The ERR indicator will light and the corresponding bit in A050 to A069 (Basic I/O Unit Information, two points per bit) will turn ON if an overcurrent or line disconnection is detected.

Terminal Connections	 • When wiring, pay careful attention to the polarity of the external power supply. The load may operate incorrectly if the polarity is reversed.

*1 Terminal numbers A0 to A8 and B0 to B8 are used in this manual, but they are not printed on the Unit.

Note Although 16 I/O bits (1 word) are allocated, only 8 of these can be used for external I/O. This Unit is also treated as a 16-point I/O Unit in the I/O tables.

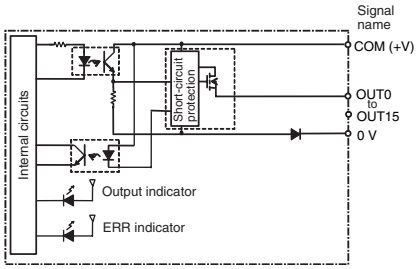
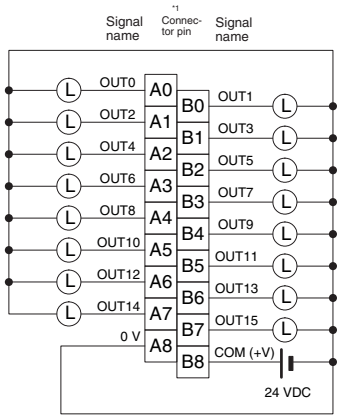
● CJ1W-OD204 Transistor Output Unit (8 Points)

Name	8-point Transistor Output Unit with Terminal Block (Sourcing Outputs)
Model	CJ1W-OD204
Rated Voltage	24 VDC
Operating Load Voltage Range	20.4 to 26.4 VDC
Maximum Load Current	0.5 A/point, 4.0 A/Unit
Leakage Current	0.1 mA max.
Residual Voltage	1.5 V max.
ON Response Time	0.5 ms max.
OFF Response Time	1.0 ms max.
Load Short-circuit Protection	Detection current: 0.7 to 2.5 A Automatic restart after error clearance. (Refer to page A-115.)
Insulation Resistance	20 MΩ between the external terminals and the GR terminal (100 VDC)
Dielectric Strength	1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Number of Circuits	8 (8 points/common, 1 circuit)
Internal Current Consumption	5 VDC, 100 mA max.
Fuse	None
External Power Supply	20.4 to 26.4 VDC, 40 mA min.
Weight	120 g max.
Circuit Configuration	 • When overcurrent is detected, the ERR indicator will light, and the corresponding flag in the Basic I/O Unit Information Area (A050 to A069) will turn ON.
Terminal Connections	 • When wiring, pay careful attention to the polarity of the external power supply. The load may operate incorrectly if the polarity is reversed.

*1 Terminal numbers A0 to A8 and B0 to B8 are used in this manual, but they are not printed on the Unit.

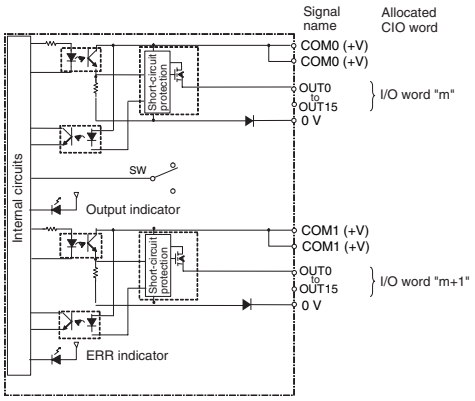
Note Although 16 I/O bits (1 word) are allocated, only 8 of these can be used for external I/O. This Unit is also treated as a 16-point I/O Unit in the I/O tables.

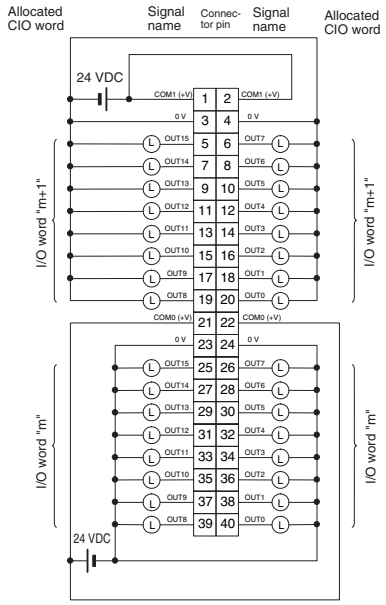
● CJ1W-OD212 Transistor Output Unit (16 Points)

Name	16-point Transistor Output Unit with Terminal Block (Sourcing Outputs)
Model	CJ1W-OD212
Rated Voltage	24 VDC
Operating Load Voltage Range	20.4 to 26.4 VDC
Maximum Load Current	0.5 A/point, 5.0 A/Unit
Maximum Inrush Current	0.1 mA max.
Leakage Current	1.5 V max.
ON Response Time	0.5 ms max.
OFF Response Time	1.0 ms max.
Load Short-circuit Protection	Detection current: 0.7 to 2.5 A Automatic restart after error clearance. (Refer to page A-115.)
Insulation Resistance	20 MΩ between the external terminals and the GR terminal (100 VDC)
Dielectric Strength	1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Number of Circuits	16 (16 points/common, 1 circuit)
Internal Current Consumption	5 VDC, 100 mA max.
External Power Supply	20.4 to 26.4 VDC, 40 mA min.
Weight	120 g max.
Circuit Configuration	 • When overcurrent is detected, the ERR indicator will light, and the corresponding flag in the Basic I/O Unit Information Area (A050 to A069) will turn ON.
Terminal Connections	 • When wiring, pay careful attention to the polarity of the external power supply. The load may operate incorrectly if the polarity is reversed.

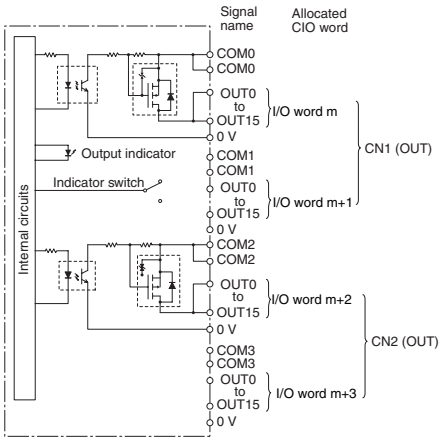
*1 Terminal numbers A0 to A8 and B0 to B8 are used in this manual, but they are not printed on the Unit.

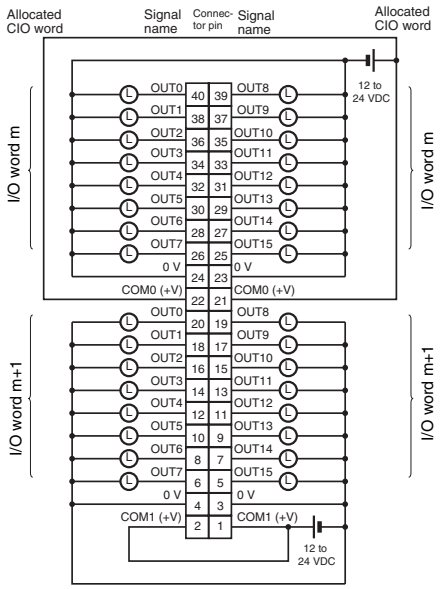
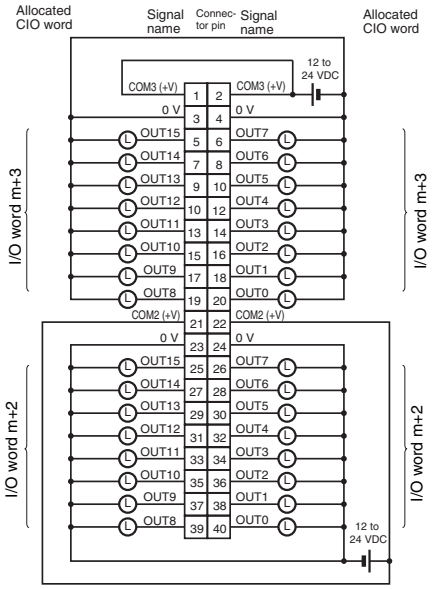
● CJ1W-OD232 Transistor Output Unit (32 Points)

Name	32-point Transistor Output Unit with MIL Connector (Sourcing Outputs)
Model	CJ1W-OD232
Rated Voltage	24 VDC
Operating Load Voltage Range	20.4 to 26.4 VDC
Maximum Load Current	0.5 A/point, 2.0 A/common, 4.0 A/Unit
Leakage Current	0.1 mA max.
Residual Voltage	1.5 V max.
ON Response Time	0.5 ms max.
OFF Response Time	1.0 ms max.
Load Short-circuit Protection	Detection current: 0.7 to 2.5 A Automatic restart after error clearance. (Refer to page A-115.)
Insulation Resistance	20 MΩ between the external terminals and the GR terminal (100 VDC)
Dielectric Strength	1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Number of Circuits	32 (16 points/common, 2 circuits)
Internal Current Consumption	5 VDC 150 mA max.
External Power Supply	20.4 to 26.4 VDC, 70 mA min.
Weight	80 g max.
Accessories	None
Circuit Configuration	 • When the output current of any output exceeds the detection current, the output for that point will turn OFF. At the same time, the ERR indicator will light and the corresponding flag (one for each common) in the Basic I/O Unit Information Area (A050 to A069) will turn ON.

Terminal Connections	 • When wiring, pay careful attention to the polarity of the external power supply. The load may operate incorrectly if the polarity is reversed. • Be sure to wire both terminals 21 and 22 (COM0 (+V)). • Be sure to wire both terminals 1 and 2 (COM1 (+V)). • Be sure to wire both terminals 3 and 4 (0 V). • Be sure to wire both terminals 23 and 24 (0 V).

● CJ1W-OD262 Transistor Output Unit (64 Points)

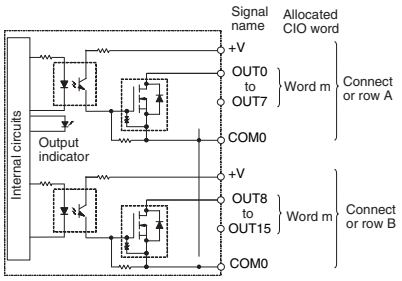
Name	64-point Transistor Output Unit with MIL Connectors (Sourcing Outputs)
Model	CJ1W-OD262
Rated Voltage	12 to 24 VDC
Operating Load Voltage Range	10.2 to 26.4 VDC
Maximum Load Current	0.3 A/point, 1.6 A/common, 6.4 A/Unit
Maximum Inrush Current	3.0 A/point, 10 ms max.
Leakage Current	0.1 mA max.
Residual Voltage	1.5 V max.
ON Response Time	0.5 ms max.
OFF Response Time	1.0 ms max.
Insulation Resistance	20 MΩ between the external terminals and the GR terminal (100 VDC)
Dielectric Strength	1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.
Number of Circuits	64 (16 points/common, 4 circuits)
Internal Current Consumption	170 mA max. (5 VDC)
Fuse	None
External Power Supply	10.2 to 26.4 VDC, 50 mA min.
Weight	110 g max.
Accessories	None
Circuit Configuration	

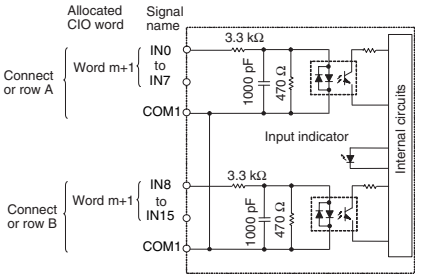
<table>
<tr><td rowspan="2">Terminal Connections</td><td>CN1</td><td>CN2</td></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td>• When wiring, pay careful attention to the polarity of the external power supply. The load may operate incorrectly if the polarity is reversed.
• Be sure to wire both terminals 21 and 22 (COM0 (+V)) of CN1.
• Be sure to wire both terminals 1 and 2 (COM1 (+V)) of CN1.
• Be sure to wire both terminals 23 and 24 (0 V) of CN1.
• Be sure to wire both terminals 3 and 4 (0 V) of CN1.</td><td>• When wiring, pay careful attention to the polarity of the external power supply. The load may operate incorrectly if the polarity is reversed.
• Be sure to wire both terminals 21 and 22 (COM2 (+V)) of CN2.
• Be sure to wire both terminals 1 and 2 (COM3 (+V)) of CN2.
• Be sure to wire both terminals 23 and 24 (0 V) of CN2.
• Be sure to wire both terminals 3 and 4 (0 V) of CN2.</td></tr>
</table>

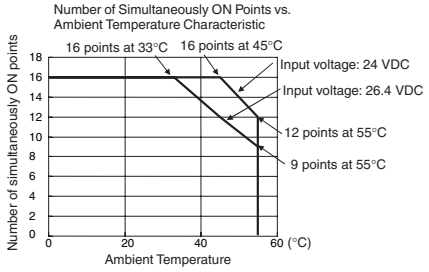
Mixed I/O Units

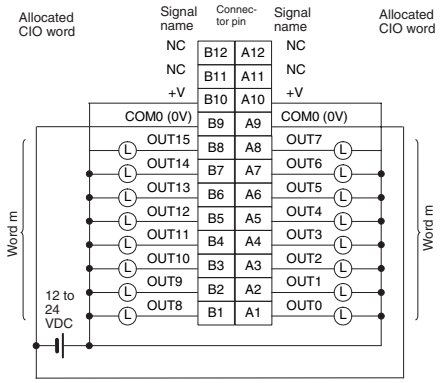
● CJ1W-MD231 DC Input/Transistor Output Unit (24 VDC, 16 Inputs/16 Outputs)

Name	16-point DC Input/16-point Transistor Output Unit with Fujitsu Connectors (Sinking Outputs)		
Model	CJ1W-MD231		
Output section (CN1)		**Input section (CN2)**	
Rated Voltage	12 to 24 VDC	**Rated Input Voltage**	24 VDC
Operating Load Voltage Range	10.2 to 26.4 VDC	**Operating Input Voltage**	20.4 to 26.4 VDC
Maximum Load Current	0.5 A/point, 2.0 A/Unit	**Input Impedance**	3.3 kΩ
Maximum Inrush Current	4.0 A/point, 10 ms max.	**Input Current**	7 mA typical (at 24 VDC)
Leakage Current	0.1 mA max.	**ON Voltage/ON Current**	14.4 VDC min./3 mA min.
Residual Voltage	1.5 V max.	**OFF Voltage/OFF Current**	5 VDC max./1 mA max.
ON Response Time	0.1 ms max.	**ON Response Time**	8.0 ms max. (Can be set to between 0 and 32 in the PLC Setup.)*1
OFF Response Time	0.8 ms max.		
No. of Circuits	16 (16 points/common, 1 circuit)	**OFF Response Time**	8.0 ms max. (Can be set to between 0 and 32 in the PLC Setup.)*1
Fuse	None		
External Power Supply	12 to 24 VDC, 20 mA min.	**No. of Circuits**	16 (16 points/common, 1 circuit)
		Number of Simultaneously ON Points	75% (at 24 VDC)
Insulation Resistance	20 MΩ between the external terminals and the GR terminal (at 100 VDC)		
Dielectric Strength	1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.		
Internal Current Consumption	5 VDC 130 mA max.		
Weight	90 g max.		
Accessories	None		
Circuit Configuration	CN1 (OUT)	CN2 (IN)	

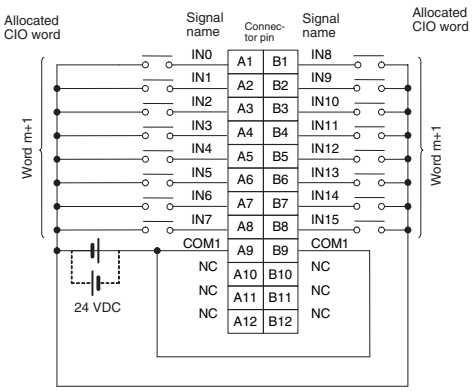






<table>
<tr><th></th><th>CN1 (OUT)</th><th>CN2 (IN)</th></tr>
<tr><td>Terminal Connections</td><td>


When wiring, pay careful attention to the polarity of the external power supply. The load may operate incorrectly if polarity is reversed.
Be sure to wire both pins A9 and B9 (COM0 (0 V)) of CN1.
Be sure to wire both pins A10 and B10 (+V) of CN1.

</td><td>


When wiring, pay careful attention to the polarity of the external power supply. The load may operate incorrectly if polarity is reversed.
Be sure to wire both pins A9 and B9 (COM1) of CN2, and set the same polarity for both pins.

</td></tr>
</table>

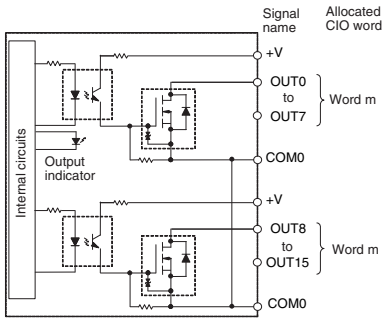
*1 The ON response time will be 20 μs maximum and OFF response time will be 400 μs maximum even if the response times are set to 0 ms due to internal element delays.

● CJ1W-MD233 DC Input/Transistor Output Unit (24 VDC, 16 Inputs/16 Outputs)

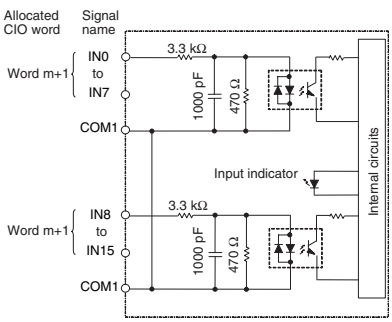
Name	16-point DC Input/16-point Transistor Output Unit with MIL Connectors (Sinking Outputs)		
Model	CJ1W-MD233		
Output section (CN1)		**Input section (CN2)**	
Rated Voltage	12 to 24 VDC	**Rated Input Voltage**	24 VDC
Operating Load Voltage Range	10.2 to 26.4 VDC	**Operating Input Voltage**	20.4 to 26.4 VDC
Maximum Load Current	0.5 A/point, 2.0 A/Unit	**Input Impedance**	3.3 kΩ
Maximum Inrush Current	4.0 A/point, 10 ms max.	**Input Current**	7 mA typical (at 24 VDC)
Leakage Current	0.1 mA max.	**ON Voltage/ON Current**	14.4 VDC min./3 mA min.
Residual Voltage	1.5 V max.	**OFF Voltage/OFF Current**	5 VDC max./1 mA max.
ON Response Time	0.1 ms max.	**ON Response Time**	8.0 ms max. (Can be set to between 0 and 32 in the PLC Setup.)*1
OFF Response Time	0.8 ms max.		
No. of Circuits	16 (16 points/common, 1 circuit)	**OFF Response Time**	8.0 ms max. (Can be set to between 0 and 32 in the PLC Setup.)*1
Fuse	None		
External Power Supply	12 to 24 VDC, 20 mA min.	**No. of Circuits**	16 (16 points/common, 1 circuit)
		Number of Simultaneously ON Points	75% (at 24 VDC)
Insulation Resistance	20 MΩ between the external terminals and the GR terminal (at 100 VDC)		
Dielectric Strength	1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.		
Internal Current Consumption	5 VDC 130 mA max.		
Weight	90 g max.		
Accessories	None		

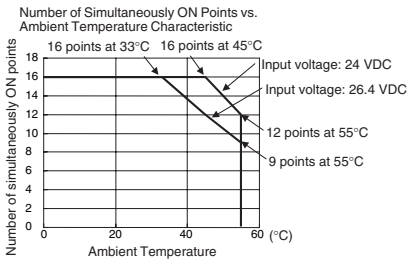
Circuit Configuration

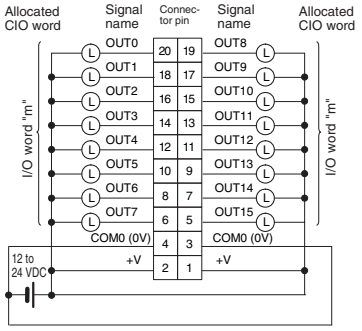
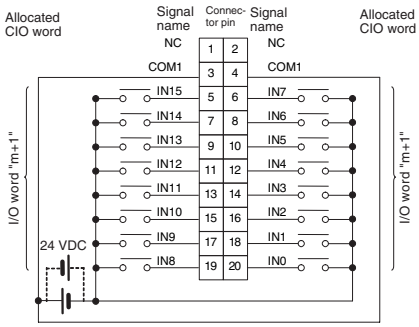
CN1 (OUT)



CN2 (IN)



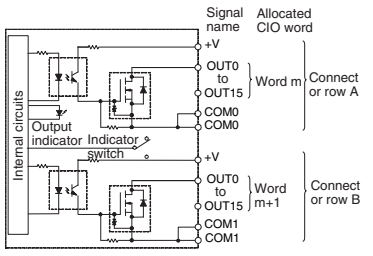


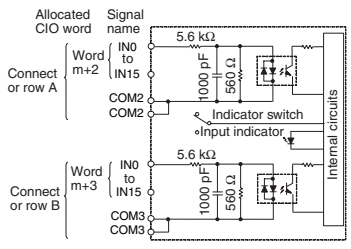
	CN1 (OUT)	CN2 (IN)
Terminal Connections	 • When wiring, pay careful attention to the polarity of the external power supply. The load may operate incorrectly if polarity is reversed. • Be sure to wire both terminals 3 and 4 (COM0 (0 V)) of CN1. • Be sure to wire both terminals 1 and 2 (+V) of CN1.	 • When wiring, pay careful attention to the polarity of the external power supply. The load may operate incorrectly if polarity is reversed. • Be sure to wire both pins 3 and 4 (COM1) of CN2, and set the same polarity for both pins.

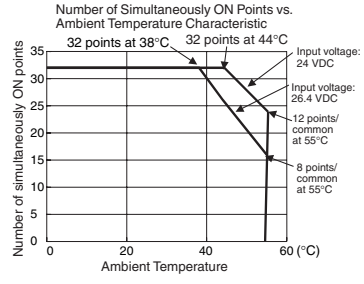
*1 The ON response time will be 20 μs maximum and OFF response time will be 400 μs maximum even if the response times are set to 0 ms due to internal element delays.

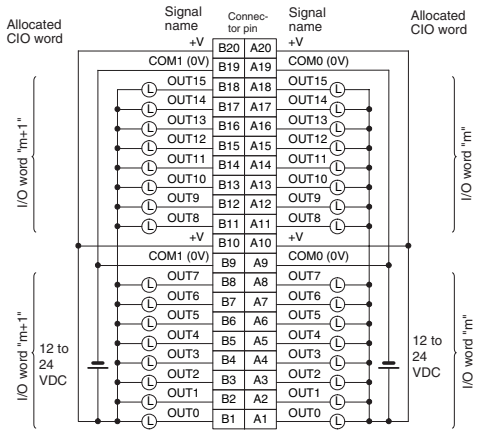
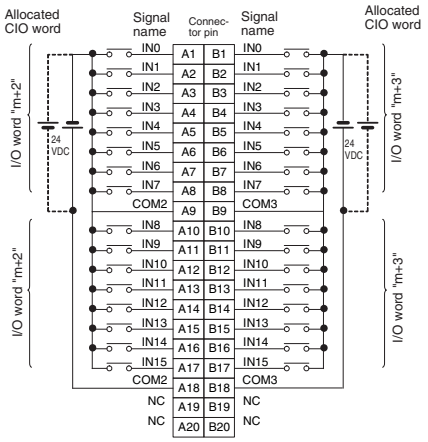
● CJ1W-MD261 DC Input/Transistor Output Unit (24 VDC 32 Inputs/32 Outputs)

Name	32-point DC Input/32-point Transistor Output Unit with Fujitsu Connectors (Sinking Outputs)		
Model	CJ1W-MD261		
Output section (CN1)		**Input section (CN2)**	
Rated Voltage	12 to 24 VDC	**Rated Input Voltage**	24 VDC
Operating Load Voltage Range	10.2 to 26.4 VDC	**Operating Input Voltage**	20.4 to 26.4 VDC
Maximum Load Current	0.3 A/point, 1.6 A/common, 3.2 A/Unit	**Input Impedance**	5.6 kΩ
Maximum Inrush Current	3.0 A/point, 10 ms max.	**Input Current**	4.1 mA typical (at 24 VDC)
Leakage Current	0.1 mA max.	**ON Voltage/ON Current**	19.0 VDC min./3 mA min. *2
Residual Voltage	1.5 V max.	**OFF Voltage/OFF Current**	5 VDC max./1 mA max.
ON Response Time	0.5 ms max.	**ON Response Time**	8.0 ms max. (Can be set to between 0 and 32 in the PLC Setup.)*1
OFF Response Time	1.0 ms max.		
No. of Circuits	32 (16 points/common, 2 circuits)	**OFF Response Time**	8.0 ms max. (Can be set to between 0 and 32 in the PLC Setup.)*1
Fuse	None		
External Power Supply	12 to 24 VDC, 30 mA min.	**No. of Circuits**	32 (16 points/common, 2 circuits)
		Number of Simultaneously ON Points	75% (24 points) (at 24 VDC)
Insulation Resistance	20 MΩ between the external terminals and the GR terminal (at 100 VDC)		
Dielectric Strength	1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.		
Internal Current Consumption	5 VDC 140 mA max.		
Weight	110 g max.		
Accessories	None		
Circuit Configuration	CN1 (OUT)	CN2 (IN)	







	CN1 (OUT)	CN2 (IN)
Terminal Connections	 • Be sure to wire both terminals A19 and A9 (COM0 (0 V)) of CN1. • Be sure to wire both terminals B19 and B9 (COM1 (0 V)) of CN1. • Be sure to wire both terminals A20 and A10 (+V) of CN1. • Be sure to wire both terminals B20 and B10 (+V) of CN1. • When wiring, pay careful attention to the polarity of the external power supply. The load may operate incorrectly if polarity is reversed.	 • Be sure to wire both pins A9 and A18 (COM2) of CN2, and set the same polarity for both pins. • Be sure to wire both pins B9 and B18 (COM3) of CN2, and set the same polarity for both pins. • When wiring, pay careful attention to the polarity of the external power supply. The load may operate incorrectly if polarity is reversed.

*1 The ON response time will be 20 μs maximum and OFF response time will be 400 μs maximum even if the response times are set to 0 ms due to internal element delays.

Note Observe the following restrictions when connecting to a 2-wire sensor.

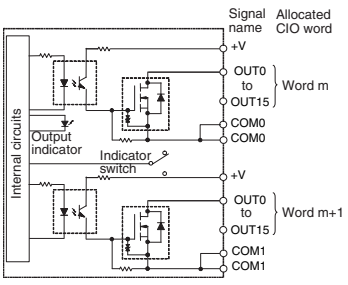
- Make sure the input power supply voltage does not exceed the ON voltage (19 V) plus the residual voltage of the sensor (approx. 3 V).
- Use a sensor with a minimum load current of 3 mA min.
- Connect bleeder resistance if you connect a sensor with a minimum load current of 5 mA or higher.

● CJ1W-MD263 DC Input/Transistor Output Unit (24 VDC 32 Inputs/32 Outputs)

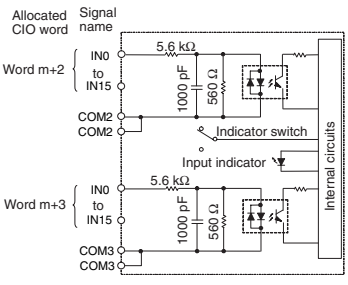
Name	32-point DC Input/32-point Transistor Output Unit with MIL Connectors (Sinking Outputs)		
Model	CJ1W-MD263		
Output section (CN1)		**Input section (CN2)**	
Rated Voltage	12 to 24 VDC	**Rated Input Voltage**	24 VDC
Operating Load Voltage Range	10.2 to 26.4 VDC	**Operating Input Voltage**	20.4 to 26.4 VDC
Maximum Load Current	0.3 A/point, 1.6 A/common, 3.2 A/Unit	**Input Impedance**	5.6 kΩ
Maximum Inrush Current	3.0 A/point, 10 ms max.	**Input Current**	4.1 mA typical (at 24 VDC)
Leakage Current	0.1 mA max.	**ON Voltage/ON Current**	19.0 VDC min./3 mA min.*2
Residual Voltage	1.5 V max.	**OFF Voltage/OFF Current**	5 VDC max./1 mA max.
ON Response Time	0.5 ms max.	**ON Response Time**	8.0 ms max. (Can be set to between 0 and 32 in the PLC Setup.)*1
OFF Response Time	1.0 ms max.		
No. of Circuits	32 (16 points/common, 2 circuits)	**OFF Response Time**	8.0 ms max. (Can be set to between 0 and 32 in the PLC Setup.)*1
Fuse	None		
External Power Supply	12 to 24 VDC, 30 mA min.	**No. of Circuits**	32 (16 points/common, 2 circuits)
		Number of Simultaneously ON Points	75% (24 points) (at 24 VDC)
Insulation Resistance	20 MΩ between the external terminals and the GR terminal (at 100 VDC)		
Dielectric Strength	1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.		
Internal Current Consumption	5 VDC 140 mA max.		
Weight	110 g max.		
Accessories	None		

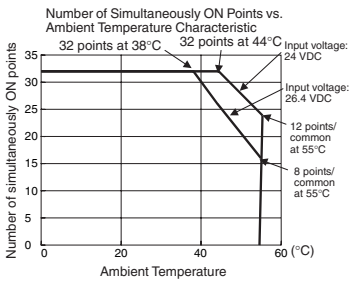
Circuit Configuration

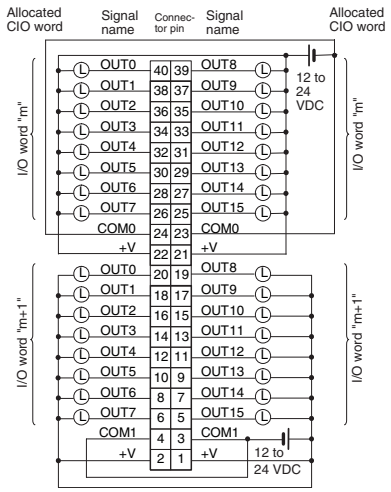
CN1 (OUT)



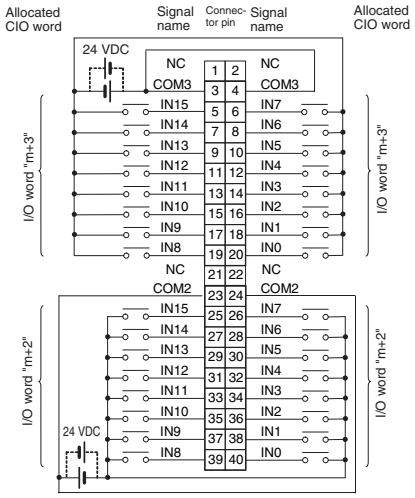
CN2 (IN)





<table>
<tr><th></th><th>CN1 (OUT)</th><th>CN2 (IN)</th></tr>
<tr><td>Terminal Connections</td><td>


Be sure to wire both terminals 23 and 24 (COM0) of CN1.
Be sure to wire both terminals 3 and 4 (COM1) of CN1.
Be sure to wire both terminals 21 and 22 (+V) of CN1.
Be sure to wire both terminals 1 and 2 (+V) of CN1.
When wiring, pay careful attention to the polarity of the external power supply. The load may operate incorrectly if polarity is reversed.

</td><td>


Be sure to wire both pins 23 and 24 (COM2) of CN2, and set the same polarity for both pins.
Be sure to wire both pins 3 and 4 (COM3) of CN2, and set the same polarity for both pins.
When wiring, pay careful attention to the polarity of the external power supply. The load may operate incorrectly if polarity is reversed.

</td></tr>
</table>

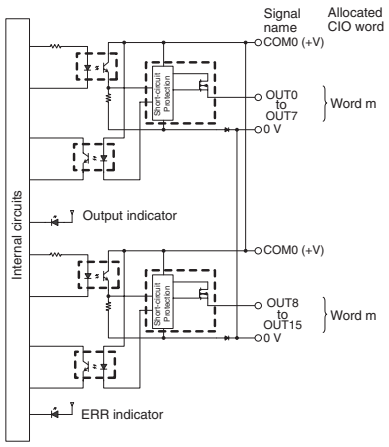
*1 The ON response time will be 20 μs maximum and OFF response time will be 400 μs maximum even if the response times are set to 0 ms due to internal element delays.

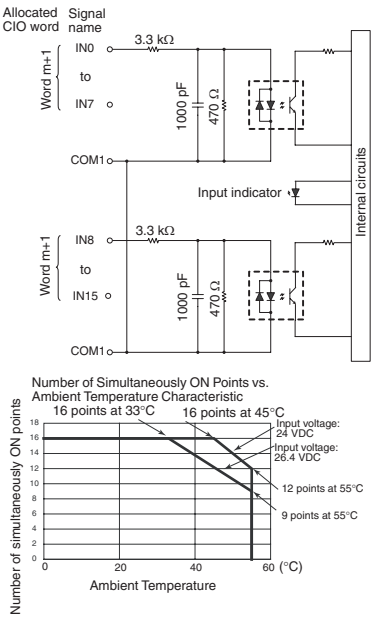
Note Observe the following restrictions when connecting to a 2-wire sensor.

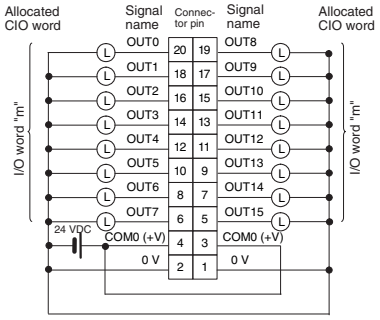
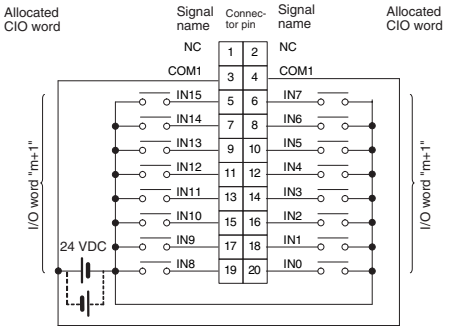
- Make sure the input power supply voltage does not exceed the ON voltage (19 V) plus the residual voltage of the sensor (approx. 3 V).
- Use a sensor with a minimum load current of 3 mA min.
- Connect bleeder resistance if you connect a sensor with a minimum load current of 5 mA or higher.

● CJ1W-MD232 DC Input/Transistor Output Unit (24 VDC, 16 inputs/16 Outputs)

Name	16-point DC Input/16-point Transistor Output Unit with MIL Connectors (Sourcing Outputs)		
Model	CJ1W-MD232		
Output section (CN1)		**Input section (CN2)**	
Rated Voltage	24 VDC	**Rated Input Voltage**	24 VDC
Operating Load Voltage Range	20.4 to 26.4 VDC	**Operating Input Voltage**	20.4 to 26.4 VDC
Maximum Load Current	0.5 A/point, 2.0 A/Unit	**Input Impedance**	3.3 kΩ
Leakage Current	0.1 mA max.	**Input Current**	7 mA typical (at 24 VDC)
Residual Voltage	1.5 V max.	**ON Voltage/ON Current**	14.4 VDC min./3 mA min.
ON Response Time	0.5 ms max.	**OFF Voltage/OFF Current**	5 VDC max./1 mA max.
OFF Response Time	1.0 ms max.	**ON Response Time**	8.0 ms max. (Can be set to between 0 and 32 in the PLC Setup.)*1
Load Short-circuit Protection	Detection current: 0.7 to 2.5 A min. Automatic restart after error clearance. (Refer to page A-115.)	**OFF Response Time**	8.0 ms max. (Can be set to between 0 and 32 in the PLC Setup.)*1
No. of Circuits	16 (16 points/common, 1 circuit)	**No. of Circuits**	16 (16 points/common, 1 circuit)
External Power Supply	20.4 to 26.4 VDC, 40 mA min.	**Number of Simultaneously ON Points**	75% (at 24 VDC)
Insulation Resistance	20 MΩ between the external terminals and the GR terminal (at 100 VDC)		
Dielectric Strength	1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.		
Internal Current Consumption	5 VDC 130 mA max.		
Weight	100 g max.		
Accessories	None		
Circuit Configuration	CN1 (OUT)	CN2 (IN)	



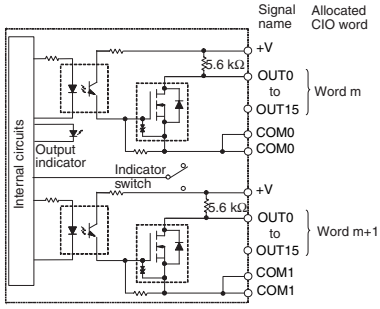


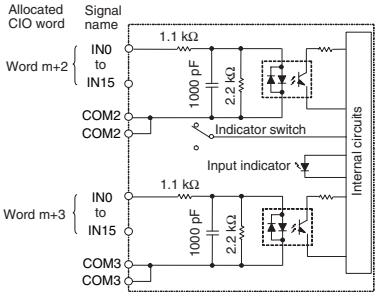
	CN1 (OUT)	CN2 (IN)
Terminal Connections	 • When wiring, pay careful attention to the polarity of the external power supply. The load may operate incorrectly if polarity is reversed. • Be sure to wire both terminals 3 and 4 (COM0 (+V)) of CN1. • Be sure to wire both terminals 1 and 2 ((0 V)) of CN1.	 • When wiring, pay careful attention to the polarity of the external power supply. The load may operate incorrectly if polarity is reversed. • Be sure to wire both pins 3 and 4 (COM1) of CN2, and set the same polarity for both pins.

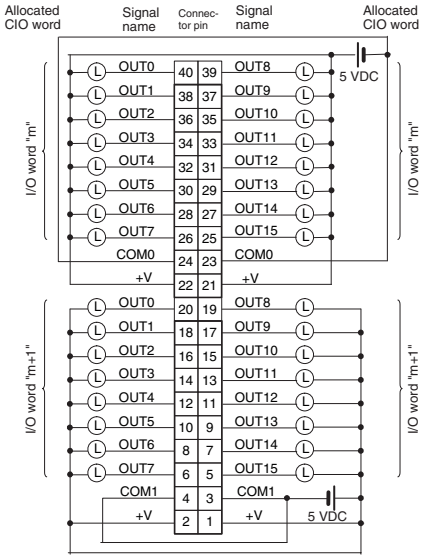
*1 The ON response time will be 20 μs maximum and OFF response time will be 400 μs maximum even if the response times are set to 0 ms due to internal element delays.

● CJ1W-MD563 TTL I/O Unit (32 Inputs/32 Outputs)

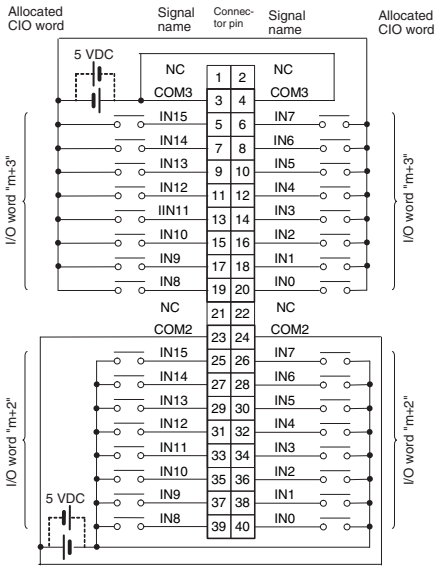
Name	32-point Input /32-point Output TTL I/O Unit with MIL Connectors		
Model	CJ1W-MD563		
Output section (CN1)		**Input section (CN2)**	
Rated Voltage	5 VDC±10%	**Rated Input Voltage**	5 VDC±10%
Operating Load Voltage Range	4.5 to 5.5 VDC	**Input Impedance**	1.1 kΩ
Maximum Load Current	35 mA/point, 560 mA/common, 1.12 A/Unit	**Input Current**	Approx. 3.5 mA (at 5 VDC)
Leakage Current	0.1 mA max.	**ON Voltage**	3.0 VDC min.
Residual Voltage	0.4 V max.	**OFF Voltage**	1.0 VDC max.
ON Response Time	0.2 ms max.	**ON Response Time**	8.0 ms max. (Can be set to between 0 and 32 in the PLC Setup.)*1
OFF Response Time	0.3 ms max.	**OFF Response Time**	8.0 ms max. (Can be set to between 0 and 32 in the PLC Setup.)*1
No. of Circuits	32 points (16 points/common, 2 circuits)		
Fuse	None	**No. of Circuits**	32 points (16 points/common, 2 circuits)
External Power Supply	5 VDC±10%, 40 mA min. (1.2 mA × No. of ON points)	**Number of Simultaneously ON Points**	100% (16 points/common)
Insulation Resistance	20 MΩ between the external terminals and the GR terminal (at 100 VDC)		
Dielectric Strength	1,000 VAC between the external terminals and the GR terminal for 1 minute at a leakage current of 10 mA max.		
Internal Current Consumption	5 VDC 190 mA max.		
Weight	110 g max.		
Accessories	None		
Circuit Configuration	CN1 (OUT)	CN2 (IN)	





<table>
<tr><th></th><th>CN1 (OUT)</th><th>CN2 (IN)</th></tr>
<tr><td>Terminal Connections</td><td>


When wiring, pay careful attention to the polarity of the external power supply. The load may operate incorrectly if the polarity is reversed.
Be sure to wire both terminals 23 and 24 (COM0) of CN1.
Be sure to wire both terminals 3 and 4 (COM1) of CN1.
Be sure to wire both terminals 21 and 22 (+V) of CN1.
Be sure to wire both terminals 1 and 2 (+V) of CN1.

</td><td>


When wiring, pay careful attention to the polarity of the external power supply. The load may operate incorrectly if the polarity is reversed.
Be sure to wire both pins 23 and 24 (COM2) of CN2, and set the same polarity for both pins.
Be sure to wire both pins 3 and 4 (COM3) of CN2, and set the same polarity for both pins.

</td></tr>
</table>

*1 The ON response time will be 20 μs maximum and OFF response time will be 400 μs maximum even if the response times are set to 0 ms due to internal element delays.

A-1-3 Precautions on Contact Output Units

Service Life Expectancy of CJ1W-OC201/211 Relays

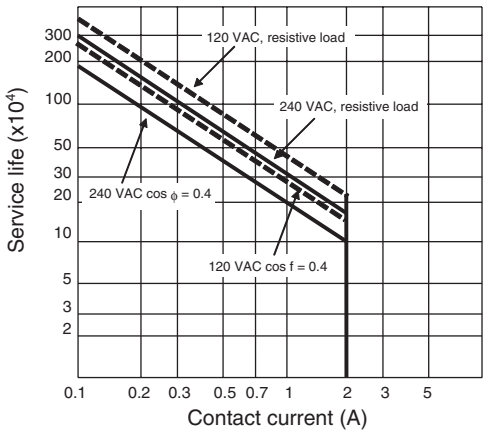
The service life expectancy of the relays (NY-24W-K-IE) in the CJ1W-OC201/211 Contact Output Units is shown in the following diagrams. Use the diagrams to calculate the relay service life based on the operating conditions, and replace the relay before the end of its service life.

Contact Current vs. Service Life Characteristic

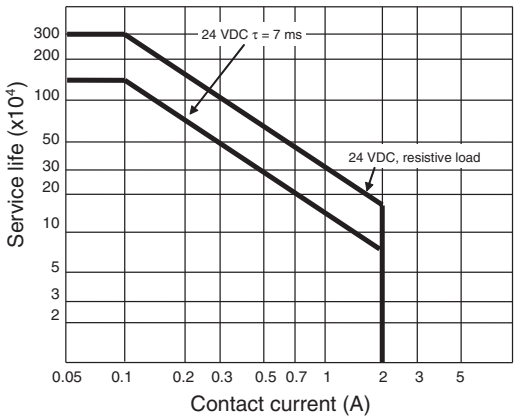
Precautions for Correct Use

The diagrams show the life expectancy of the relay itself. Do not use a contact current, therefore, that exceeds the maximum switching capacity specified in the specifications for each Contact Output Unit. If a switching capacity exceeding the specifications is used, the reliability and life expectancy of other parts will be reduced and the Unit may malfunction.

Service Life with AC Load



Service Life with DC Load



Switching frequency: 1,800 operations/hour max.

Inductive Load

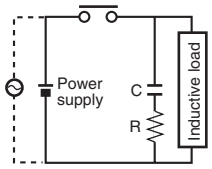
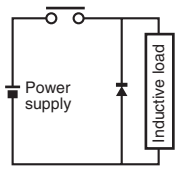
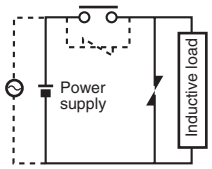
The life of the Relay varies with the load inductance. If any inductive load is connected to the Contact Output Unit, use an arc killer with the Contact Output Unit using an inductive load. (See next page.)

Be sure to connect a diode in parallel with every DC inductive load that is connected to the Contact Output Unit.

Contact Protection Circuit

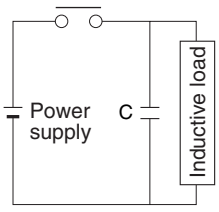
Arc killers are used with the Contact Output Unit in order to prolong the life of each Relay mounted to the Contact Output Unit, prevent noise, and reduce the generation of carbide and nitrate deposits. Arc killers can, however, reduce relay life if not use correctly.

Arc killers are used with the Contact Output Unit in order to prolong the life of each Relay mounted to the Contact Output Unit, prevent noise, and reduce the generation of carbide and nitrate deposits. Arc killers can, however, reduce relay life if not used correctly.

Circuit		Current		Characteristic	Required element
		AC	DC		
CR method		Yes	Yes	If the load is a relay or solenoid, there is a time lag between the moment the circuit is opened and the moment the load is reset. If the supply voltage is 24 or 48 V, insert the arc killer in parallel with the load. If the supply voltage is 100 to 200 V, insert the arc killer between the contacts.	The capacitance of the capacitor must be 1 to 0.5 μF per contact current of 1 A and resistance of the resistor must be 0.5 to 1 Ω per contact voltage of 1 V. These values, however, vary with the load and the characteristics of the relay. Decide these values from experiments, and take into consideration that the capacitance suppresses spark discharge when the contacts are separated and the resistance limits the current that flows into the load when the circuit is closed again. The dielectric strength of the capacitor must be 200 to 300 V. If the circuit is an AC circuit, use a capacitor with no polarity.
Diode method		No	Yes	The diode connected in parallel with the load changes energy accumulated by the coil into a current, which then flows into the coil so that the current will be converted into Joule heat by the resistance of the inductive load. This time lag, between the moment the circuit is opened and the moment the load is reset, caused by this method is longer than that caused by the CR method.	The reversed dielectric strength value of the diode must be at least 10 times as large as the circuit voltage value. The forward current of the diode must be the same as or larger than the load current. The reversed dielectric strength value of the diode may be two to three times larger than the supply voltage if the arc killer is applied to electronic circuits with low circuit voltages.
Varistor method		Yes	Yes	The varistor method prevents the imposition of high voltage between the contacts by using the constant voltage characteristic of the varistor. There is time lag between the moment the circuit is opened and the moment the load is reset. If the supply voltage is 24 or 48 V, insert the varistor in parallel with the load. If the supply voltage is 100 to 200 V, insert the varistor between the contacts.	---

Precautions for Correct Use

Do not connect a capacitor as an arc killer in parallel with an inductive load as shown in the following diagram. This arc killer is very effective for preventing spark discharge at the moment when the circuit is opened. However, when the contacts are closed, the contacts may be welded due to the current charged in the capacitor.



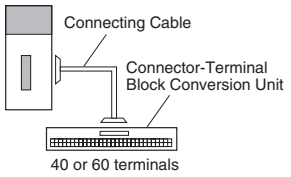
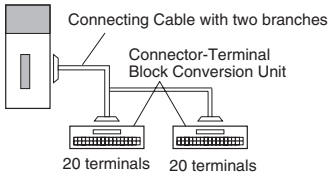
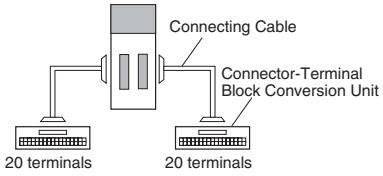
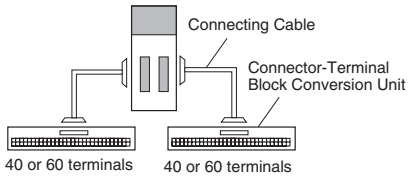
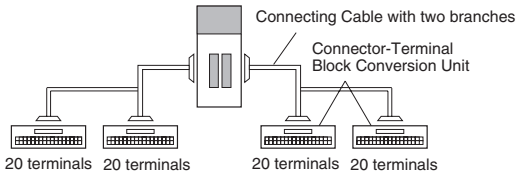
DC inductive loads can be more difficult to switch than resistive loads. If appropriate arc killers are used, however, DC inductive loads will be as easy to switch as resistive loads.

A-1-4 Connecting Connector-Terminal Block Conversion Units and I/O Relay Terminals

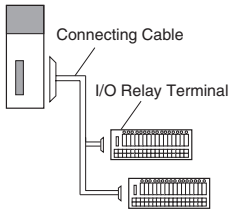
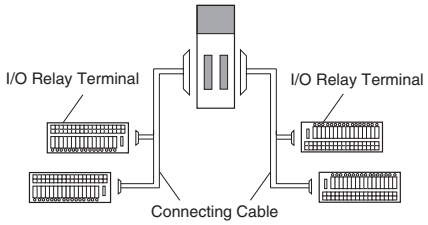
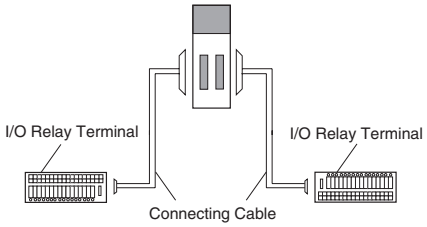
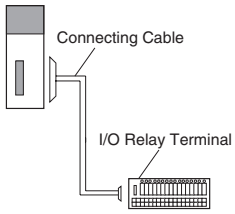
Patterns for Combining Connector-Terminal Block Conversion Units and I/O Relay Terminals

The following patterns can be used to connect Basic I/O Units with Connectors to OMRON Connector-Terminal Block Conversion Units and I/O Relay Terminals using OMRON Connecting Cables.

● Connection Patterns for Connector-Terminal Block Conversion Units

Pattern	Configuration	Number of connectors	Branching
A		1	None
B			2 branches
C		2	None
D			
F			2 branches

● Connection Patterns for I/O Relay Terminals

Pattern	Configuration
A	
B	
E	
F	

Combinations of Connections

Combinations of OMRON Connecting Cables with Connector-Terminal Block Conversion Units and I/O Relay Terminals are shown below.

● Connections to Connector-Terminal Block Conversion Units

Refer to the pages given in the right columns for connection diagrams and details on the Connector-Terminal Block Conversion Units and Connecting Cables.

Unit	I/O capacity	Number of connectors	Polarity	Connection pattern*1	Number of branches	Connecting Cable	Connector-Terminal Block Conversion Unit	Common terminal	Connection diagram
CJ1W-ID231	32 inputs	1 Fujitsu connector	NPN/PNP	A	None	XW2Z-□□□B	XW2D-40G6	None	A-63
				A	None	XW2Z-□□□B	XW2D-40G6-RF*3	None	
				A	None	XW2Z-□□□B	XW2B-40G5	None	---
				A	None	XW2Z-□□□B	XW2B-40G4	None	---
				A	None	XW2Z-□□□BU	XW2D-40C6	None	---
				B	2	XW2Z-□□□D	XW2D-20G6 (2 Units)	None	---
				B	2	XW2Z-□□□D	XW2B-20G5 (2 Units)	None	---
				B	2	XW2Z-□□□D	XW2B-20G4 (2 Units)	None	---
				B	2	XW2Z-□□□D	XW2C-20G6-IO16 (2 Units)	Yes	A-63
				B	2	XW2Z-□□□D	XW2C-20G5-IN16 (2 Units)*2	Yes	---
				B	2	XW2Z-□□□D	XW2E-20G5-IN16 (2 Units)*2	Yes	---
				B	2	XW2Z-□□□D	XW2F-20G7-IN16 (2 Units)*2	Yes	---
				B	2	XW2Z-□□□D	XW2N-20G8-IN16 (2 Units)*2	Yes	---
CJ1W-ID232	32 inputs	1 MIL connector	NPN/PNP	A	None	XW2Z-□□□K	XW2D-40G6	None	A-64
				A	None	XW2Z-□□□K	XW2D-40G6-RM*3	None	
				A	None	XW2Z-□□□K	XW2B-40G5	None	---
				A	None	XW2Z-□□□K	XW2B-40G4	None	---
				B	2	XW2Z-□□□N	XW2D-20G6 (2 Units)	None	---
				B	2	XW2Z-□□□N	XW2B-20G5 (2 Units)	None	---
				B	2	XW2Z-□□□N	XW2B-20G4 (2 Units)	None	---
				B	2	XW2Z-□□□N	XW2C-20G6-IO16 (2 Units)	Yes	A-64
				B	2	XW2Z-□□□N	XW2C-20G5-IN16 (2 Units)*2	Yes	---
				B	2	XW2Z-□□□N	XW2E-20G5-IN16 (2 Units)*2	Yes	---
				B	2	XW2Z-□□□N	XW2F-20G7-IN16 (2 Units)*2	Yes	---
				B	2	XW2Z-□□□N	XW2N-20G8-IN16 (2 Units)*2	Yes	---
CJ1W-ID261	64 inputs	2 Fujitsu connectors	NPN/PNP	D	None	XW2Z-□□□B	XW2D-40G6	None	A-65
				D	None	XW2Z-□□□B	XW2D-40G6-RF*3	None	
				D	None	XW2Z-□□□B	XW2B-40G5	None	---
				D	None	XW2Z-□□□B	XW2B-40G4	None	---
				D	None	XW2Z-□□□BU	XW2D-40C6	None	---
				F	2	XW2Z-□□□D	XW2D-20G6 (2 Units)	None	---
				F	2	XW2Z-□□□D	XW2B-20G5 (2 Units)	None	---
				F	2	XW2Z-□□□D	XW2B-20G4 (2 Units)	None	---
				F	2	XW2Z-□□□D	XW2C-20G6-IO16 (2 Units)	Yes	A-65
				F	2	XW2Z-□□□D	XW2C-20G5-IN16 (2 Units)*2	Yes	---
				F	2	XW2Z-□□□D	XW2E-20G5-IN16 (2 Units)*2	Yes	---
				F	2	XW2Z-□□□D	XW2F-20G7-IN16 (2 Units)*2	Yes	---
				F	2	XW2Z-□□□D	XW2N-20G8-IN16 (2 Units)*2	Yes	---

Unit	I/O capacity	Number of connectors	Polarity	Connection pattern*1	Number of branches	Connecting Cable	Connector-Terminal Block Conversion Unit	Common terminal	Connection diagram
CJ1W-ID262	64 inputs	2 MIL connectors	NPN/PNP	D	None	XW2Z-□□□K	XW2D-40G6	None	A-66
				D	None	XW2Z-□□□K	XW2D-40G6-RM*3	None	
				D	None	XW2Z-□□□K	XW2B-40G5	None	---
				D	None	XW2Z-□□□K	XW2B-40G4	None	---
				F	2	XW2Z-□□□N	XW2D-20G6 (2 Units)	None	---
				F	2	XW2Z-□□□N	XW2B-20G5 (2 Units)	None	---
				F	2	XW2Z-□□□N	XW2B-20G4 (2 Units)	None	---
				F	2	XW2Z-□□□N	XW2C-20G6-IO16 (2 Units)	Yes	A-66
				F	2	XW2Z-□□□N	XW2C-20G5-IN16 (2 Units)*2	Yes	---
				F	2	XW2Z-□□□N	XW2E-20G5-IN16 (2 Units)*2	Yes	---
				F	2	XW2Z-□□□N	XW2F-20G7-IN16 (2 Units)*2	Yes	---
				F	2	XW2Z-□□□N	XW2N-20G8-IN16 (2 Units)*2	Yes	---
CJ1W-OD231	32 outputs	1 Fujitsu connector	NPN	A	None	XW2Z-□□□B	XW2D-40G6	None	A-67
				A	None	XW2Z-□□□B	XW2B-40G5	None	---
				A	None	XW2Z-□□□B	XW2B-40G4	None	---
				A	None	XW2Z-□□□BU	XW2D-40C6	None	A-67
				B	2	XW2Z-□□□L	XW2D-20G6 (2 Units)	None	---
				B	2	XW2Z-□□□L	XW2B-20G5 (2 Units)	None	---
				B	2	XW2Z-□□□L	XW2B-20G4 (2 Units)	None	---
				B	2	XW2Z-□□□L	XW2C-20G6-IO16 (2 Units)	Yes	A-67
				B	2	XW2Z-□□□L	XW2F-20G7-OUT16 (2 Units)	Yes	---
CJ1W-OD232	32 outputs	1 MIL connector	PNP	A	None	XW2Z-□□□K	XW2D-40G6	None	A-68
				A	None	XW2Z-□□□K	XW2B-40G5	None	---
				A	None	XW2Z-□□□K	XW2B-40G4	None	---
				B	2	XW2Z-□□□N	XW2D-20G6 (2 Units)	None	---
				B	2	XW2Z-□□□N	XW2B-20G5 (2 Units)	None	---
				B	2	XW2Z-□□□N	XW2B-20G4 (2 Units)	None	---
				B	2	XW2Z-□□□N	XW2C-20G6-IO16 (2 Units)	Yes	A-68
				B	2	XW2Z-□□□N	XW2F-20G7-OUT16 (2 Units)	Yes	---
CJ1W-OD233	32 outputs	1 MIL connector	NPN	A	None	XW2Z-□□□K	XW2D-40G6	None	A-69
				A	None	XW2Z-□□□K	XW2B-40G5	None	---
				A	None	XW2Z-□□□K	XW2B-40G4	None	---
				B	2	XW2Z-□□□N	XW2D-20G6 (2 Units)	None	---
				B	2	XW2Z-□□□N	XW2B-20G5 (2 Units)	None	---
				B	2	XW2Z-□□□N	XW2B-20G4 (2 Units)	None	---
				B	2	XW2Z-□□□N	XW2C-20G6-IO16 (2 Units)	Yes	A-69
				B	2	XW2Z-□□□N	XW2F-20G7-OUT16 (2 Units)	Yes	---
CJ1W-OD261	64 outputs	2 Fujitsu connectors	NPN	D	None	XW2Z-□□□B	XW2D-40G6	None	A-70
				D	None	XW2Z-□□□B	XW2B-40G5	None	---
				D	None	XW2Z-□□□B	XW2B-40G4	None	---
				D	None	XW2Z-□□□BU	XW2D-40C6	None	A-70
				F	2	XW2Z-□□□L	XW2D-20G6 (2 Units)	None	---
				F	2	XW2Z-□□□L	XW2B-20G5 (2 Units)	None	---
				F	2	XW2Z-□□□L	XW2B-20G4 (2 Units)	None	---
				F	2	XW2Z-□□□L	XW2C-20G6-IO16 (2 Units)	Yes	A-70
				F	2	XW2Z-□□□L	XW2F-20G7-OUT16 (2 Units)	Yes	---

Unit	I/O capacity	Number of connectors	Polarity	Connection pattern*1	Number of branches	Connecting Cable	Connector-Terminal Block Conversion Unit	Common terminal	Connection diagram
CJ1W-OD262	64 outputs	2 MIL connectors	PNP	D	None	XW2Z-□□□K	XW2D-40G6	None	A-71
				D	None	XW2Z-□□□K	XW2B-40G5	None	---
				D	None	XW2Z-□□□K	XW2B-40G4	None	---
				F	2	XW2Z-□□□N	XW2D-20G6 (2 Units)	None	---
				F	2	XW2Z-□□□N	XW2B-20G5 (2 Units)	None	---
				F	2	XW2Z-□□□N	XW2B-20G4 (2 Units)	None	---
				F	2	XW2Z-□□□N	XW2C-20G6-IO16 (2 Units)	Yes	A-71
				F	2	XW2Z-□□□N	XW2F-20G7-OUT16 (2 Units)	Yes	---
CJ1W-OD263	64 outputs	2 MIL connectors	NPN	D	None	XW2Z-□□□K	XW2D-40G6	None	A-72
				D	None	XW2Z-□□□K	XW2B-40G5	None	---
				D	None	XW2Z-□□□K	XW2B-40G4	None	---
				F	2	XW2Z-□□□N	XW2D-20G6 (2 Units)	None	---
				F	2	XW2Z-□□□N	XW2B-20G5 (2 Units)	None	---
				F	2	XW2Z-□□□N	XW2B-20G4 (2 Units)	None	---
				F	2	XW2Z-□□□N	XW2C-20G6-IO16 (2 Units)	Yes	A-72
				F	2	XW2Z-□□□N	XW2F-20G7-OUT16 (2 Units)	Yes	---

Unit	I/O capacity	Number of connectors	Polarity	Connection pattern[*1]	Number of branches	Connecting Cable	Connector-Terminal Block Conversion Unit	Common terminal	Connection diagram
CJ1W-MD231	16 inputs	1 Fujitsu connector	NPN/PNP	C	None	XW2Z-□□□A	XW2D-20G6	None	A-73
				C	None	XW2Z-□□□A	XW2B-20G5	None	---
				C	None	XW2Z-□□□A	XW2B-20G4	None	---
				C	None	XW2Z-□□□A	XW2C-20G6-IO16	Yes	A-74
				C	None	XW2Z-□□□A	XW2C-20G5-IN16[*2]	Yes	---
				C	None	XW2Z-□□□A	XW2E-20G5-IN16[*2]	Yes	---
				C	None	XW2Z-□□□A	XW2F-20G7-IN16[*2]	Yes	---
				C	None	XW2Z-□□□A	XW2N-20G8-IN16[*2]	Yes	---
	16 outputs	1 Fujitsu connector	NPN	C	None	XW2Z-□□□A	XW2D-20G6	None	A-73
				C	None	XW2Z-□□□A	XW2B-20G5	None	---
				C	None	XW2Z-□□□A	XW2B-20G4	None	---
				C	None	XW2Z-□□□A	XW2C-20G6-IO16	Yes	A-74
				C	None	XW2Z-□□□A	XW2F-20G7-OUT16	Yes	---
CJ1W-MD232	16 inputs	1 MIL connector	NPN/PNP	C	None	XW2Z-□□□X	XW2D-20G6	None	A-75
				C	None	XW2Z-□□□X	XW2B-20G5	None	---
				C	None	XW2Z-□□□X	XW2B-20G4	None	---
	16 outputs	1 MIL connector	PNP	C	None	XW2Z-□□□X	XW2D-20G6	None	A-75
				C	None	XW2Z-□□□X	XW2B-20G5	None	---
				C	None	XW2Z-□□□X	XW2B-20G4	None	---
CJ1W-MD233	16 inputs	1 MIL connector	NPN/PNP	C	None	XW2Z-□□□X	XW2D-20G6	None	A-75
				C	None	XW2Z-□□□X	XW2B-20G5	None	---
				C	None	XW2Z-□□□X	XW2B-20G4	None	---
	16 outputs	1 MIL connector	NPN	C	None	XW2Z-□□□X	XW2D-20G6	None	A-75
				C	None	XW2Z-□□□X	XW2B-20G5	None	---
				C	None	XW2Z-□□□X	XW2B-20G4	None	---
CJ1W-MD261	32 outputs	1 Fujitsu connector	NPN/PNP	D	None	XW2Z-□□□B	XW2D-40G6	None	A-76
				D	None	XW2Z-□□□B	XW2D-40G6-RF[*3]	None	
				D	None	XW2Z-□□□B	XW2B-40G5	None	---
				D	None	XW2Z-□□□B	XW2B-40G4	None	---
				D	None	XW2Z-□□□BU	XW2D-40C6	None	---
				F	2	XW2Z-□□□D	XW2D-20G6 (2 Units)	None	---
				F	2	XW2Z-□□□D	XW2B-20G5 (2 Units)	None	---
				F	2	XW2Z-□□□D	XW2B-20G4 (2 Units)	None	---
				F	2	XW2Z-□□□D	XW2C-20G6-IO16 (2 Units)	Yes	A-77
				F	2	XW2Z-□□□D	XW2C-20G5-IN16 (2 Units)[*2]	Yes	---
				F	2	XW2Z-□□□D	XW2E-20G5-IN16 (2 Units)[*2]	Yes	---
				F	2	XW2Z-□□□D	XW2F-20G7-IN16 (2 Units)[*2]	Yes	---
				F	2	XW2Z-□□□D	XW2N-20G8-IN16 (2 Units)[*2]	Yes	---
	32 outputs	1 Fujitsu connector	NPN	D	None	XW2Z-□□□B	XW2D-40G6	None	A-76
				D	None	XW2Z-□□□B	XW2B-40G5	None	---
				D	None	XW2Z-□□□B	XW2B-40G4	None	---
				D	None	XW2Z-□□□BU	XW2D-40C6	None	---
				F	2	XW2Z-□□□L	XW2D-20G6 (2 Units)	None	---
				F	2	XW2Z-□□□L	XW2B-20G5 (2 Units)	None	---
				F	2	XW2Z-□□□L	XW2B-20G4 (2 Units)	None	---
				F	2	XW2Z-□□□L	XW2C-20G6-IO16 (2 Units)	Yes	A-77
				F	2	XW2Z-□□□L	XW2F-20G7-OUT16 (2 Units)	Yes	---

Unit	I/O capacity	Number of connectors	Polarity	Connection pattern*1	Number of branches	Connecting Cable	Connector-Terminal Block Conversion Unit	Common terminal	Connection diagram
CJ1W-MD263	32 inputs	1 MIL connector	NPN/PNP	D	None	XW2Z-□□□K	XW2D-40G6	None	A-78
				D	None	XW2Z-□□□K	XW2D-40G6-RM*3	None	---
				D	None	XW2Z-□□□K	XW2B-40G5	None	---
				D	None	XW2Z-□□□K	XW2B-40G4	None	---
				F	2	XW2Z-□□□N	XW2D-20G6 (2 Units)	None	---
				F	2	XW2Z-□□□N	XW2B-20G5 (2 Units)	None	---
				F	2	XW2Z-□□□N	XW2B-20G4 (2 Units)	None	---
				F	2	XW2Z-□□□N	XW2C-20G6-IO16 (2 Units)	Yes	A-79
				F	2	XW2Z-□□□N	XW2C-20G5-IN16 (2 Units)*2	Yes	---
				F	2	XW2Z-□□□N	XW2E-20G5-IN16 (2 Units)*2	Yes	---
				F	2	XW2Z-□□□N	XW2F-20G7-IN16 (2 Units)*2	Yes	---
				F	2	XW2Z-□□□N	XW2N-20G8-IN16 (2 Units)*2	Yes	---
	32 outputs	1 MIL connector	NPN	D	None	XW2Z-□□□K	XW2D-40G6	None	A-78
				D	None	XW2Z-□□□K	XW2B-40G5	None	---
				D	None	XW2Z-□□□K	XW2B-40G4	None	---
				F	2	XW2Z-□□□N	XW2D-20G6 (2 Units)	None	---
				F	2	XW2Z-□□□N	XW2B-20G5 (2 Units)	None	---
				F	2	XW2Z-□□□N	XW2B-20G4 (2 Units)	None	---
				F	2	XW2Z-□□□N	XW2C-20G6-IO16 (2 Units)	Yes	A-79
				F	2	XW2Z-□□□N	XW2F-20G7-OUT16 (2 Units)	Yes	---
CJ1W-MD563	32 inputs	1 MIL connector	NPN/PNP	D	None	XW2Z-□□□K	XW2D-40G6	None	A-80
				D	None	XW2Z-□□□K	XW2D-40G6-RM*3	None	
				D	None	XW2Z-□□□K	XW2B-40G5	None	---
				D	None	XW2Z-□□□K	XW2B-40G4	None	---
				F	2	XW2Z-□□□N	XW2D-20G6 (2 Units)	None	---
				F	2	XW2Z-□□□N	XW2B-20G5 (2 Units)	None	---
				F	2	XW2Z-□□□N	XW2B-20G4 (2 Units)	None	---
	32 outputs	1 MIL connector	NPN	D	None	XW2Z-□□□K	XW2D-40G6	None	A-80
				D	None	XW2Z-□□□K	XW2B-40G5	None	---
				D	None	XW2Z-□□□K	XW2B-40G4	None	---
				F	2	XW2Z-□□□N	XW2D-20G6 (2 Units)	None	---
				F	2	XW2Z-□□□N	XW2B-20G5 (2 Units)	None	---
				F	2	XW2Z-□□□N	XW2B-20G4 (2 Units)	None	---

*1 For Units with both inputs and outputs, refer to the connection patterns for both input and output connections.

*2 The inputs are NPN. For PNP inputs, reverse the polarity of the external power supply connections to the power supply terminals on the Connector-Terminal Block Conversion Unit.

*3 Bleeder resistance (5.6 kΩ) is built in.

● Connections to I/O Relay Terminals

Refer to the pages given in the right columns for connection diagrams and details on the I/O Relay Terminals and Connecting Cables.

Unit	I/O capacity	Number of connectors	Polarity	Connection pattern*1	Number of branches	Connecting Cable	I/O Relay Terminal	Connection diagram
CJ1W-ID231	32 inputs	1 Fujitsu connector	NPN	A	2	G79-I□C-□	G7TC-ID16	A-81
				A	2	G79-I□C-□	G7TC-IA16	
CJ1W-ID232	32 inputs	1 MIL connector	NPN	A	2	G79-O□-□-D1	G7TC-ID16	
				A	2	G79-O□-□-D1	G7TC-IA16	
CJ1W-ID261	64 inputs	2 Fujitsu connectors	NPN	B	2	G79-I□C-□	G7TC-ID16	
				B	2	G79-I□C-□	G7TC-IA16	
CJ1W-ID262	64 inputs	2 MIL connectors	NPN	B	2	G79-O□-□-D1	G7TC-ID16	
				B	2	G79-O□-□-D1	G7TC-IA16	
CJ1W-OD231	32 outputs	1 Fujitsu connector	NPN	A	2	G79-O□C-□	G7TC-OC16	A-84
				A	2	G79-O□C-□	G7TC-OC08	
				A	2	G79-O□C-□	G70D-SOC16	A-83
				A	2	G79-O□C-□	G70D-FOM16	---
				A	2	G79-O□C-□	G70D-VSOC16	A-82
				A	2	G79-O□C-□	G70D-VFOM16	---
				A	2	G79-O□C-□	G70A-ZOC16-3 and Relay	A-85
				A	2	G79-O□C-□	G70R-SOC08	A-84
				A	2	G79-O□C-□	G70D-SOC08	A-83
CJ1W-OD232	32 outputs	1 MIL connector	PNP	A	2	G79-I□-□-D1	G7TC-OC16-1	A-85
				A	2	G79-O□-□-D1	G70D-SOC16-1	---
				A	2	G79-O□-□-D1	G70D-FOM16-1	---
				A	2	G79-O□-□-D1	G70A-ZOC16-4 and Relay	---
CJ1W-OD233	32 outputs	1 MIL connector	NPN	A	2	G79-O□-□-D1	G7TC-OC16	A-84
				A	2	G79-O□-□-D1	G7TC-OC08	
				A	2	G79-O□-□-D1	G70D-SOC16	A-83
				A	2	G79-O□-□-D1	G70D-FOM16	---
				A	2	G79-O□-□-D1	G70D-VSOC16	A-82
				A	2	G79-O□-□-D1	G70D-VFOM16	---
				A	2	G79-O□-□-D1	G70A-ZOC16-3 and Relay	A-85
				A	2	G79-O□-□-D1	G70R-SOC08	A-84
				A	2	G79-O□-□-D1	G70D-SOC08	A-83
CJ1W-OD261	64 outputs	2 Fujitsu connectors	NPN	B	2	G79-O□C-□	G7TC-OC16	A-84
				B	2	G79-O□C-□	G7TC-OC08	
				B	2	G79-O□C-□	G70D-SOC16	A-83
				B	2	G79-O□C-□	G70D-FOM16	---
				B	2	G79-O□C-□	G70D-VSOC16	A-82
				B	2	G79-O□C-□	G70D-VFOM16	---
				B	2	G79-O□C-□	G70A-ZOC16-3 and Relay	A-85
				B	2	G79-O□C-□	G70R-SOC08	A-84
				B	2	G79-O□C-□	G70D-SOC08	A-83
CJ1W-OD262	64 outputs	2 MIL connectors	PNP	B	2	G79-I□-□-D1	G7TC-OC16-1	A-85
				B	2	G79-O□-□-D1	G70D-SOC16-1	---
				B	2	G79-O□-□-D1	G70D-FOM16-1	---
				B	2	G79-O□-□-D1	G70A-ZOC16-4 and Relay	---

Unit	I/O capacity	Number of connectors	Polarity	Connection pattern*1	Number of branches	Connecting Cable	I/O Relay Terminal	Connection diagram
CJ1W-OD263	64 outputs	2 MIL connectors	NPN	B	2	G79-O□-□-D1	G7TC-OC16	A-84
				B	2	G79-O□-□-D1	G7TC-OC08	
				B	2	G79-O□-□-D1	G70D-SOC16	A-83
				B	2	G79-O□-□-D1	G70D-FOM16	---
				B	2	G79-O□-□-D1	G70D-VSOC16	A-82
				B	2	G79-O□-□-D1	G70D-VFOM16	---
				B	2	G79-O□-□-D1	G70A-ZOC16-3 and Relay	A-85
				B	2	G79-O□-□-D1	G70R-SOC08	A-84
				B	2	G79-O□-□-D1	G70D-SOC08	A-83

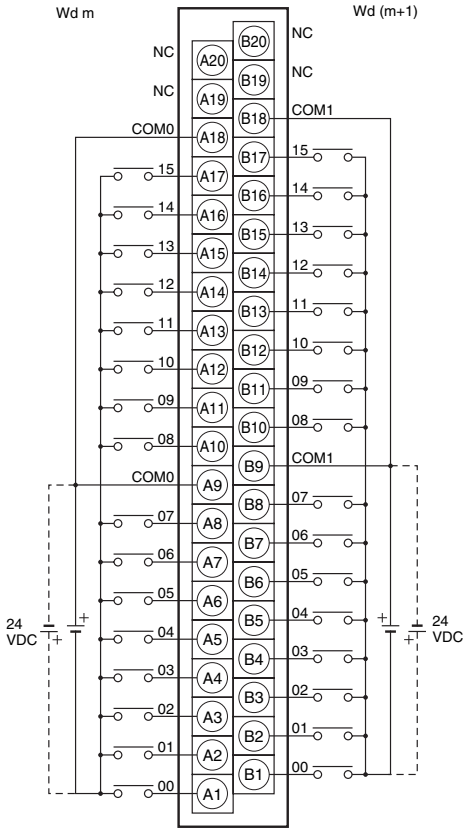
Unit	I/O capacity	Number of connectors	Polarity	Connection pattern*1	Number of branches	Connecting Cable	I/O Relay Terminal	Connection diagram
CJ1W-MD231	16 inputs	1 Fujitsu connector	NPN	F	None	G79-□C	G7TC-ID16	A-81
				F	None	G79-□C	G7TC-IA16	
	16 outputs	1 Fujitsu connector	NPN	F	None	G79-□C	G7TC-OC16	A-84
				F	None	G79-□C	G7TC-OC08	
				F	None	G79-□C	G70D-SOC16	A-83
				F	None	G79-□C	G70D-FOM16	---
				F	None	G79-□C	G70D-VSOC16	A-82
				F	None	G79-□C	G70D-VFOM16	---
				F	None	G79-□C	G70A-ZOC16-3 and Relay	A-85
				F	None	G79-□C	G70R-SOC08	A-84
				F	None	G79-□C	G70D-SOC08	A-83
CJ1W-MD232	16 outputs	1 MIL connector	PNP	F	None	G79-O□C	G7TC-OC16-1	A-85
				F	None	G79-I□C	G70D-SOC16-1	---
				F	None	G79-I□C	G70D-FOM16-1	---
				F	None	G79-I□C	G70A-ZOC16-4 and Relay	---
CJ1W-MD233	16 inputs	1 MIL connector	NPN	E	None	G79-O□C	G7TC-ID16	A-81
				E	None	G79-O□C	G7TC-IA16	
	16 outputs	1 MIL connector	NPN	E	None	G79-O□C	G7TC-OC16	A-84
				E	None	G79-O□C	G7TC-OC08	
				E	None	G79-O□C	G70D-SOC16	A-83
				E	None	G79-O□C	G70D-FOM16	---
				E	None	G79-O□C	G70D-VSOC16	A-82
				E	None	G79-O□C	G70D-VFOM16	---
				E	None	G79-O□C	G70A-ZOC16-3 and Relay	A-85
				E	None	G79-O□C	G70R-SOC08	A-84
				E	None	G79-O□C	G70D-SOC08	A-83
CJ1W-MD261	32 inputs	1 Fujitsu connector	NPN	B	2	G79-I□C-□	G7TC-ID16	A-81
				B	2	G79-I□C-□	G7TC-IA16	
	32 outputs	1 Fujitsu connector	NPN	B	2	G79-O□C-□	G7TC-OC16	A-84
				B	2	G79O□C-□	G7TC-OC08	
				B	2	G79-O□C-□	G70D-SOC16	A-83
				B	2	G79-O□C-□	G70D-FOM16	---
				B	2	G79-O□C-□	G70D-VSOC16	A-82
				B	2	G79-O□C-□	G70D-VFOM16	---
				B	2	G79O□C-□	G70A-ZOC16-3 and Relay	A-85
				B	2	G79-O□C-□	G70R-SOC08	A-84
				B	2	G79-O□C-□	G70D-SOC08	A-83
CJ1W-MD263	32 inputs	1 MIL connector	NPN	B	2	G79-O□-□-D1	G7TC-ID16	A-81
				B	2	G79-O□-□-D1	G7TC-IA16	
	32 outputs	1 MIL connector	NPN	B	2	G79-O□-□-D1	G7TC-OC16	A-84
				B	2	G79-O□-□-D1	G7TC-OC08	
				B	2	G79-O□-□-D1	G70D-SOC16	A-83
				B	2	G79-O□-□-D1	G70D-FOM16	---
				B	2	G79-O□-□-D1	G70D-VSOC16	A-82
				B	2	G79-O□-□-D1	G70D-VFOM16	---
				B	2	G79-O□-□-D1	G70A-ZOC16-3 and Relay	A-85
				B	2	G79-O□-□-D1	G70R-SOC08	A-84
				B	2	G79-O□-□-D1	G70D-SOC08	A-83

*1 For Units with both inputs and outputs, refer to the connection patterns for both input and output connections.

Connector-Terminal Block Conversion Unit Connection Diagrams

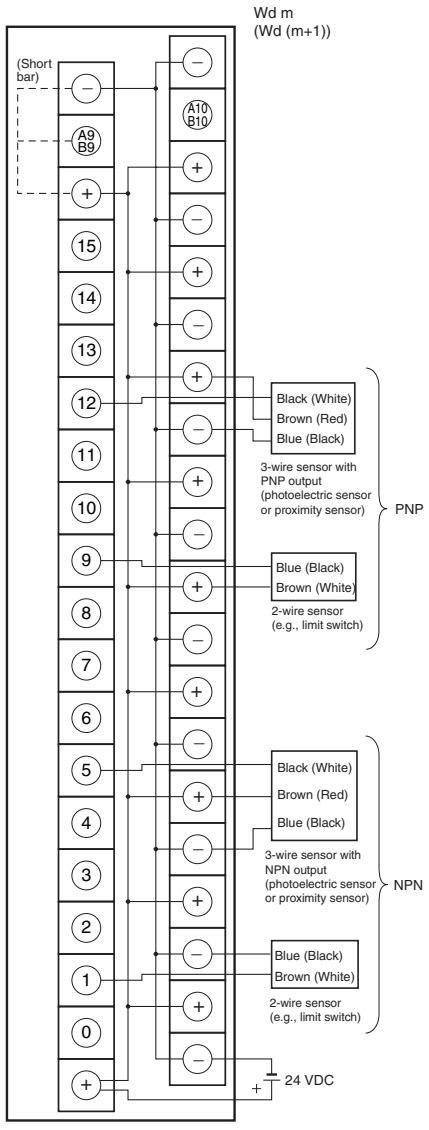
The applicable terminals on the Connector-Terminal Block Conversion Unit and external connection diagrams are provided below for Basic I/O Unit connections to Connector-Terminal Block Conversion Units.

● Inputs

Programmable Controller I/O Unit	CJ1W-ID231
Connector-Terminal Block Conversion Unit	XW2D-40G6 XW2D-40G6-RF
Connecting Cables	XW2Z-□□□B
Connection diagram	

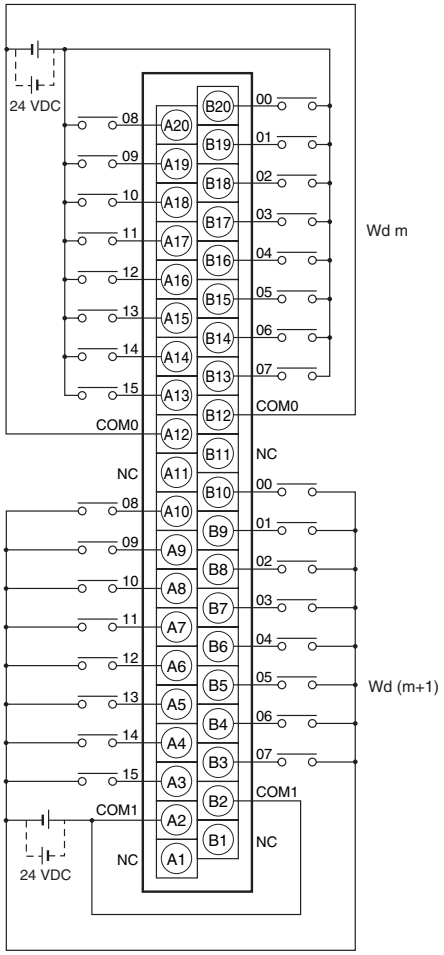
Note 1 The polarity for input power supply connections indicated with dotted lines (- - - - -) can be connected in either direction provided that the same polarity is used for the commons for rows A and B.

2 Both COM0 and COM1 have two pins each. They are internally connected inside the PLC, but they must all be wired.

Programmable Controller I/O Unit	CJ1W-ID231
Connector-Terminal Block Conversion Unit	XW2C-20G6-IO16 (two Units)
Connecting Cables	XW2Z-□□□D
Connection diagram	

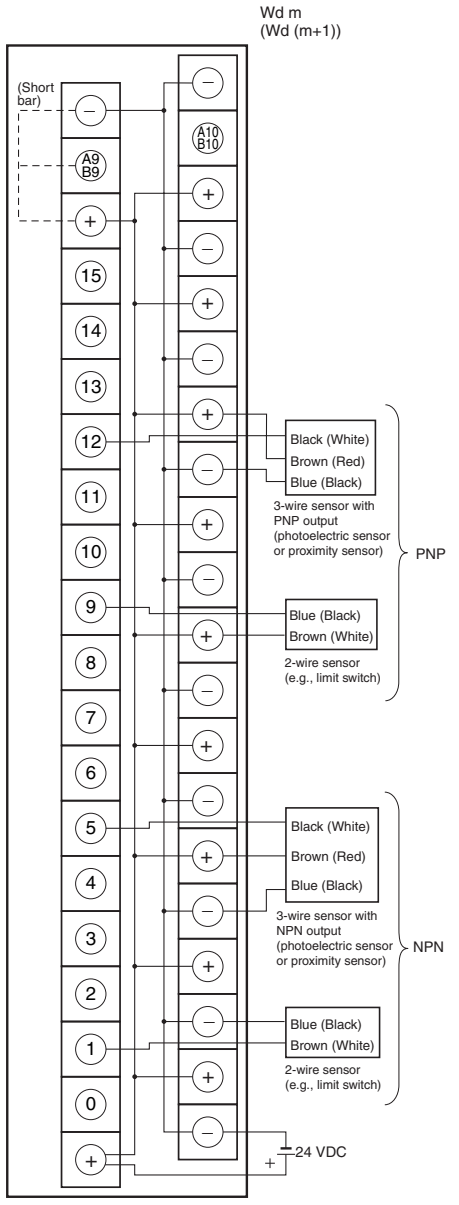
Note 1 Connect the A9/B9 terminal and the ⊕ terminal for NPN.
Connect the A9/B9 terminal and the ⊖ terminal for PNP.
(Use the enclosed short bar.)

2 The COM terminals are wired inside the Connector-Terminal Block Conversion Unit.

Programmable Controller I/O Unit	CJ1W-ID232
Connector-Terminal Block Conversion Unit	XW2D-40G6 XW2D-40G6-RM
Connecting Cables	XW2Z-□□□K
Connection diagram	

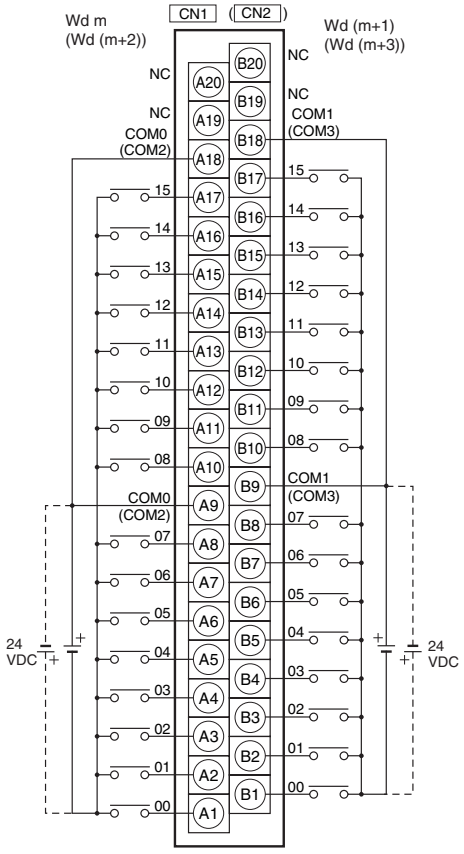
Note 1 The polarity for input power supply connections indicated with dotted lines (- - - - -) can be connected in either direction provided that the same polarity is used for the commons.

2 Both COM0 and COM1 have two pins each. They are internally connected inside the PLC, but they must all be wired.

Programmable Controller I/O Unit	CJ1W-ID232
Connector-Terminal Block Conversion Unit	XW2C-20G6-IO16 (2 Units)
Connecting Cables	XW2Z-□□□N
Connection diagram	

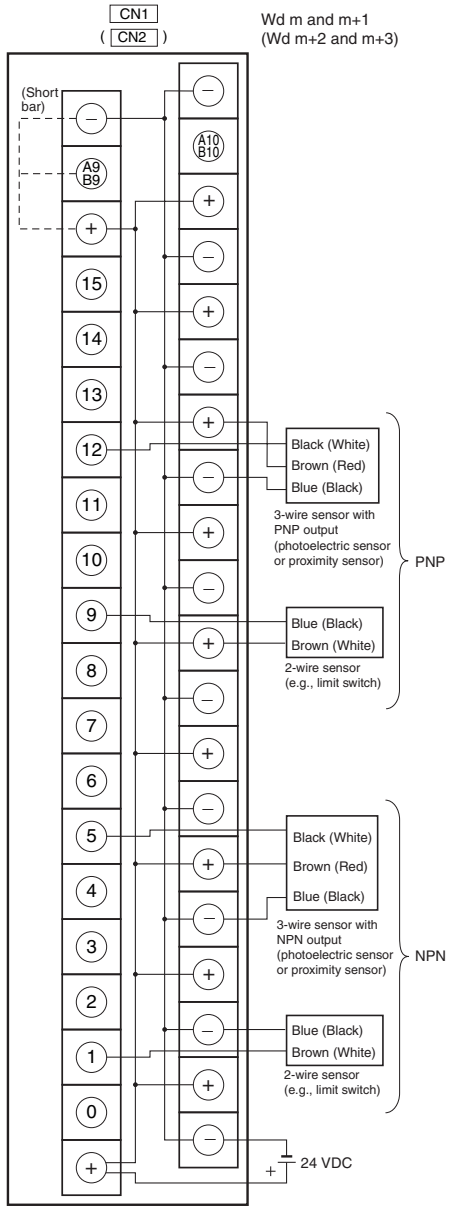
Note 1 Connect the A9/B9 terminal and the ⊕ terminal for NPN.
Connect the A9/B9 terminal and the ⊖ terminal for PNP.
(Use the enclosed short bar.)

2 The COM terminals are wired inside the Connector-Terminal Block Conversion Unit.

Programmable Controller I/O Unit	CJ1W-ID261
Connector-Terminal Block Conversion Unit	XW2D-40G6 XW2D-40G6-RF
Connecting Cables	XW2Z-□□□B
Connection diagram	

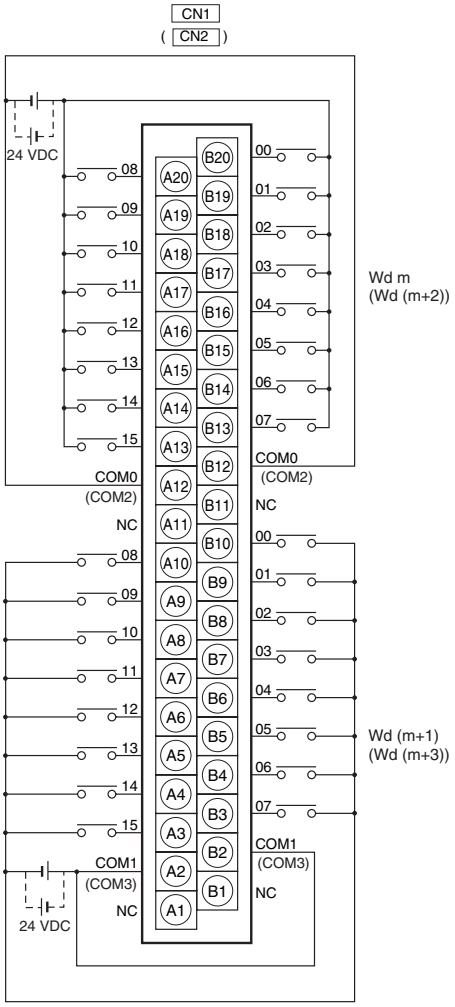
Note 1 The polarity for input power supply connections indicated with dotted lines (- - - - -) can be connected in either direction provided that the same polarity is used for the commons for rows A and B.

2 COM0, COM1, COM2, and COM3 have two pins each. They are internally connected inside the PLC, but they must all be wired.

Programmable Controller I/O Unit	CJ1W-ID261
Connector-Terminal Block Conversion Unit	XW2C-20G6-IO16 (2 Units)
Connecting Cables	XW2Z-□□□D
Connection diagram	

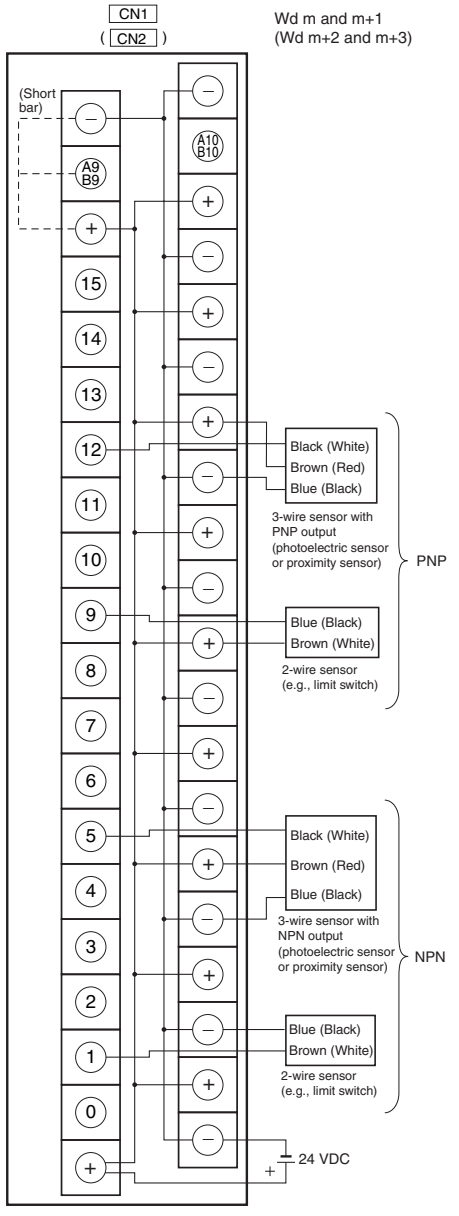
Note 1 Connect the A9/B9 terminal and the ⊕ terminal for NPN.
Connect the A9/B9 terminal and the ⊖ terminal for PNP.
(Use the enclosed short bar.)

2 The COM terminals are wired inside the Connector-Terminal Block Conversion Unit.

Programmable Controller I/O Unit	CJ1W-ID262
Connector-Terminal Block Conversion Unit	XW2D-40G6 XW2D-40G6-RM
Connecting Cables	XW2Z-□□□K
Connection diagram	

Note 1 The polarity for input power supply connections indicated with dotted lines (- - - - -) can be connected in either direction provided that the same polarity is used for the commons.

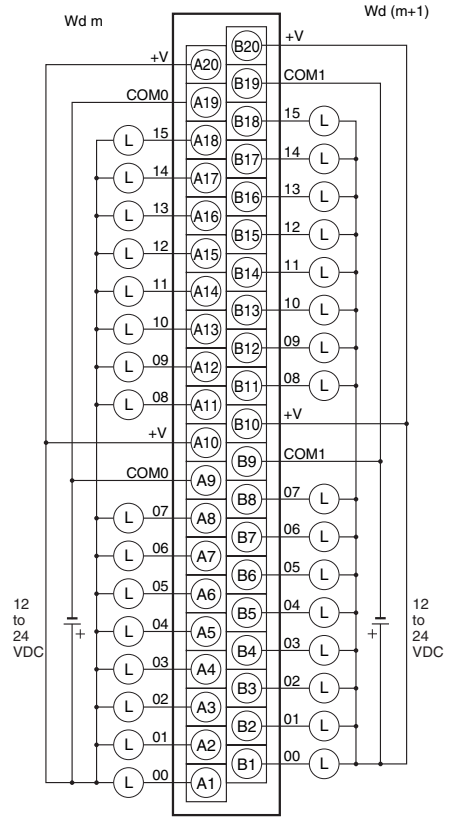
2 COM0, COM1, COM2, and COM3 have two pins each. They are internally connected inside the PLC, but they must all be wired.

Programmable Controller I/O Unit	CJ1W-ID262
Connector-Terminal Block Conversion Unit	XW2C-20G6-IO16 (2 Units)
Connecting Cables	XW2Z-□□□N
Connection diagram	

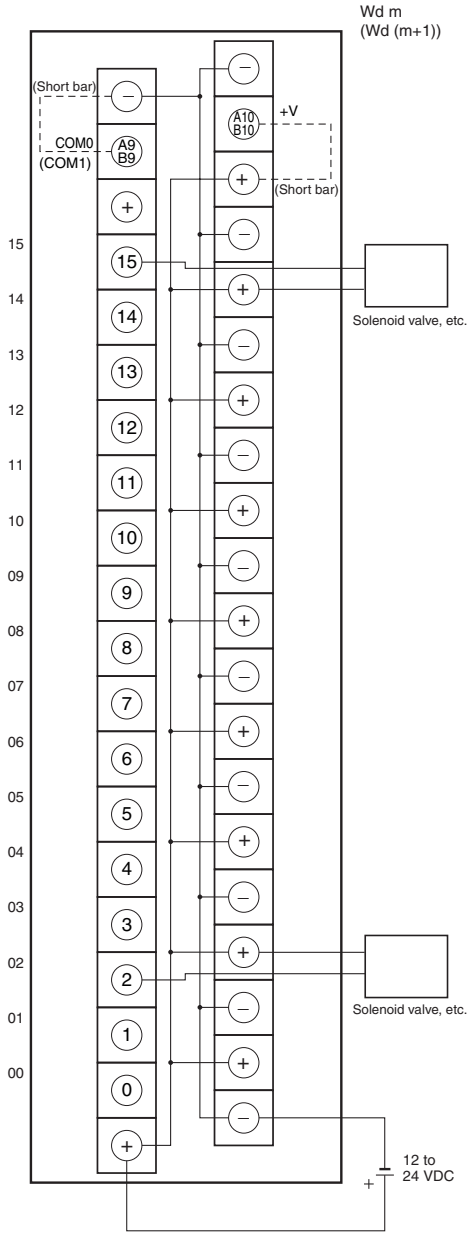
Note 1 Connect the A9/B9 terminal and the ⊕ terminal for NPN.
Connect the A9/B9 terminal and the ⊖ terminal for PNP.
(Use the enclosed short bar.)

2 The COM terminals are wired inside the Connector-Terminal Block Conversion Unit.

● Outputs

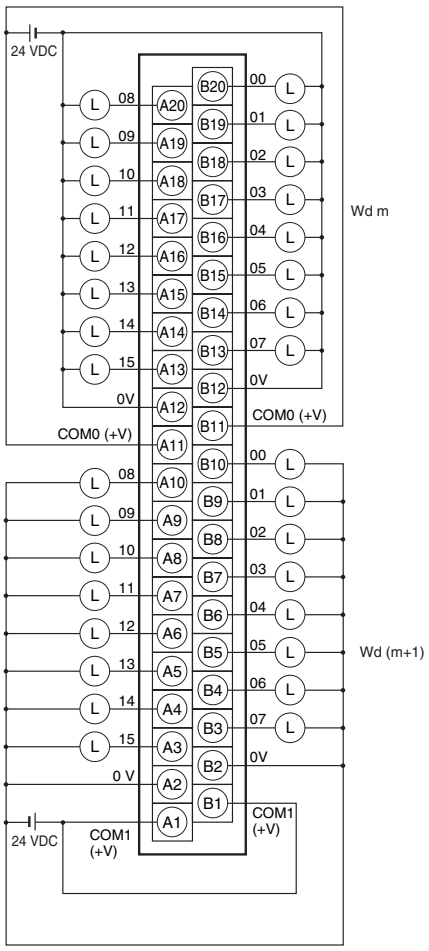
Programmable Controller I/O Unit	CJ1W-OD231
Connector-Terminal Block Conversion Unit	XW2D-40G6 XW2D-40C6
Connecting Cables	XW2Z-□□□B XW2Z-□□□BU
Connection diagram	

Note The +V terminals and COM terminals are internally connected inside the PLC, but they must all be wired.

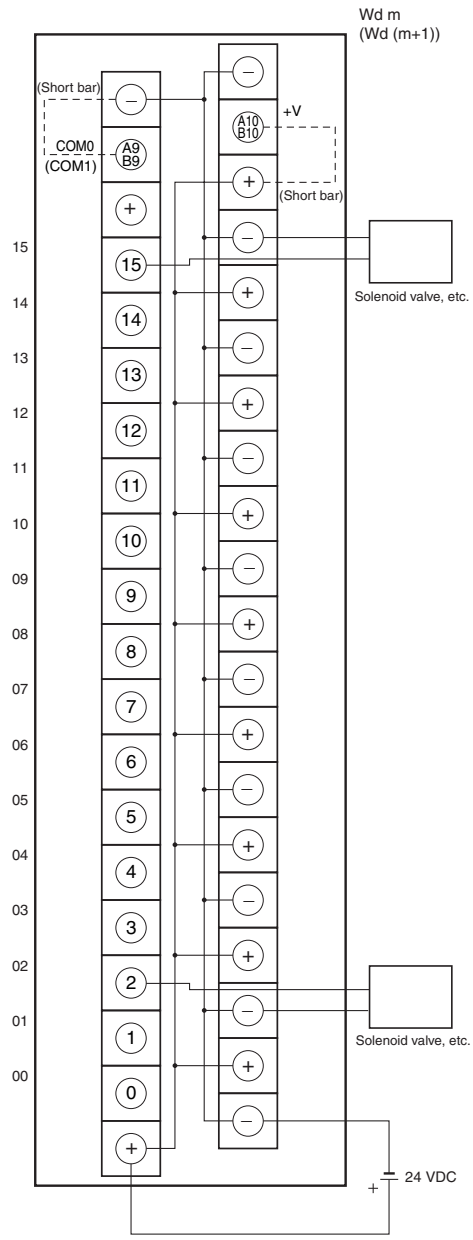
Programmable Controller I/O Unit	CJ1W-OD231
Connector-Terminal Block Conversion Unit	XW2C-20G6-IO16 (2 Units)
Connecting Cables	XW2Z-□□□L
Connection diagram	

Note 1 Connect the A9/B9 terminal and the ⊖ terminal. Connect the A10/B10 terminal and the ⊕ terminal. (Use the enclosed short bar.)

2 The COM terminals are wired inside the Connector-Terminal Block Conversion Unit.

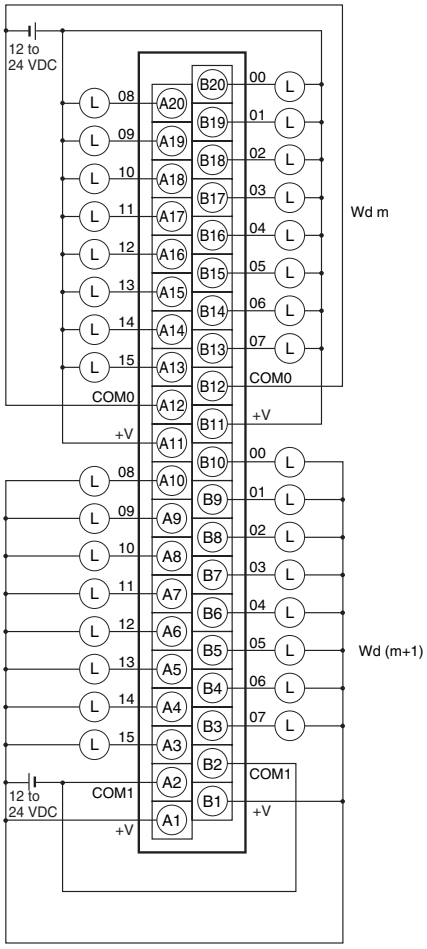
Programmable Controller I/O Unit	CJ1W-OD232
Connector-Terminal Block Conversion Unit	XW2D-40G6
Connecting Cables	XW2Z-□□□K
Connection diagram	

Note The COM (+V) terminals and 0 V terminals are internally connected inside the PLC, but they must all be wired.

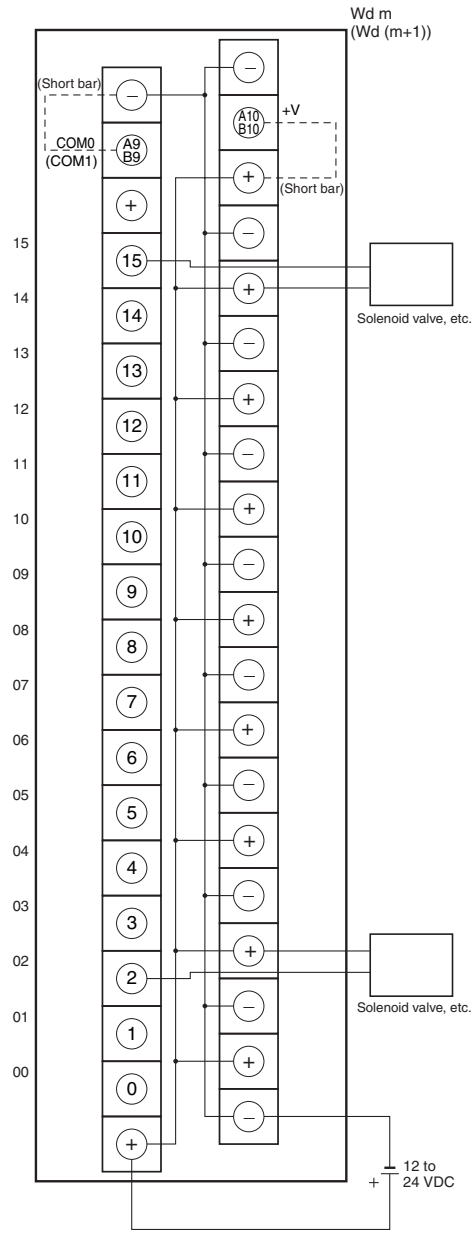
Programmable Controller I/O Unit	CJ1W-OD232
Connector-Terminal Block Conversion Unit	XW2C-20G6-IO16 (2 Units)
Connecting Cables	XW2Z-□□□N
Connection diagram	

Note 1 Connect the A9/B9 terminal and the ⊖ terminal. Connect the A10/B10 terminal and the ⊕ terminal. (Use the enclosed short bar.)

2 The COM terminals are wired inside the Connector-Terminal Block Conversion Unit.

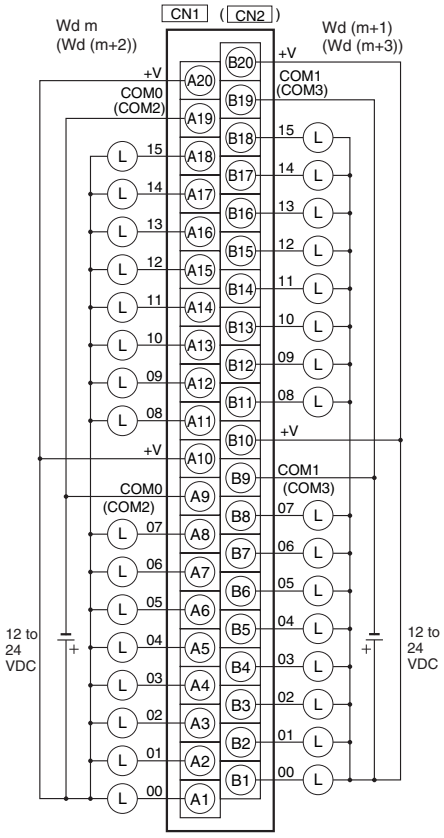
Programmable Controller I/O Unit	CJ1W-OD233
Connector-Terminal Block Conversion Unit	XW2D-40G6
Connecting Cables	XW2Z-□□□K
Connection diagram	

Note The +V terminals and COM terminals are internally connected inside the PLC, but they must all be wired.

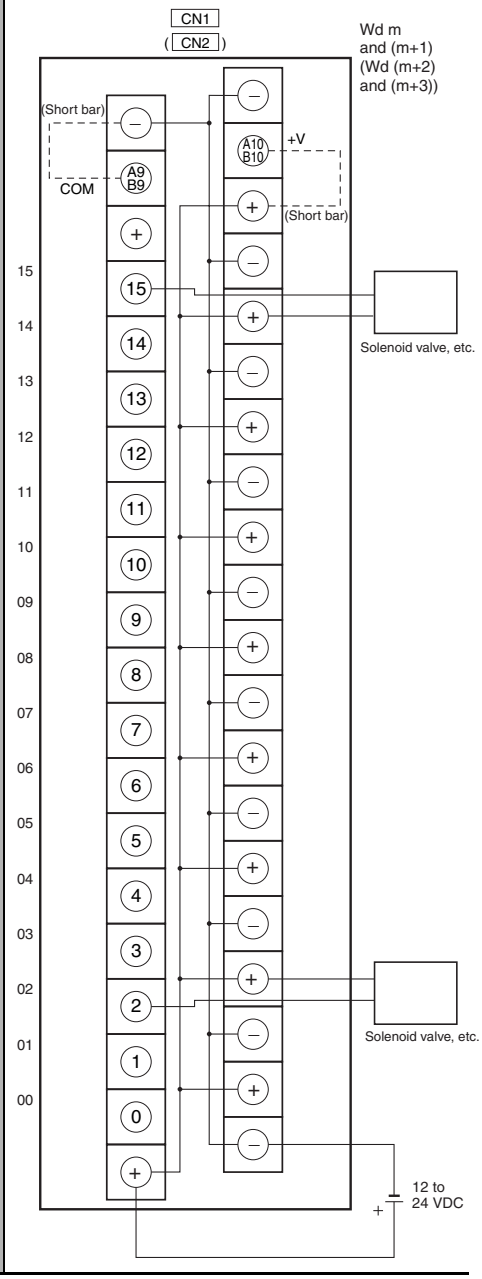
Programmable Controller I/O Unit	CJ1W-OD233
Connector-Terminal Block Conversion Unit	XW2C-20G6-IO16 (2 Units)
Connecting Cables	XW2Z-□□□N
Connection diagram	

Note 1 Connect the A9/B9 terminal and the ⊖ terminal. Connect the A10/B10 terminal and the ⊕ terminal. (Use the enclosed short bar.)

2 The COM terminals are wired inside the Connector-Terminal Block Conversion Unit.

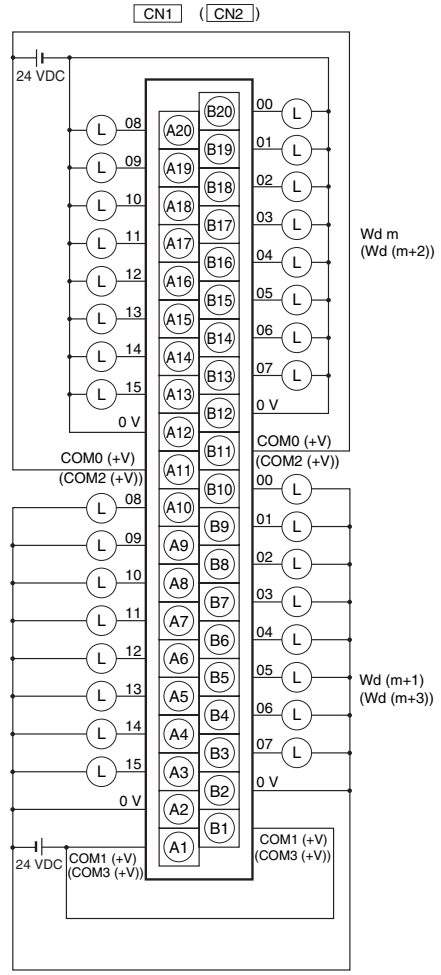
Programmable Controller I/O Unit	CJ1W-OD261
Connector-Terminal Block Conversion Unit	XW2D-40G6 XW2D-40C6
Connecting Cables	XW2Z-□□□B XW2Z-□□□BU
Connection diagram	

Note The +V terminals and COM terminals are internally connected inside the PLC, but they must all be wired.

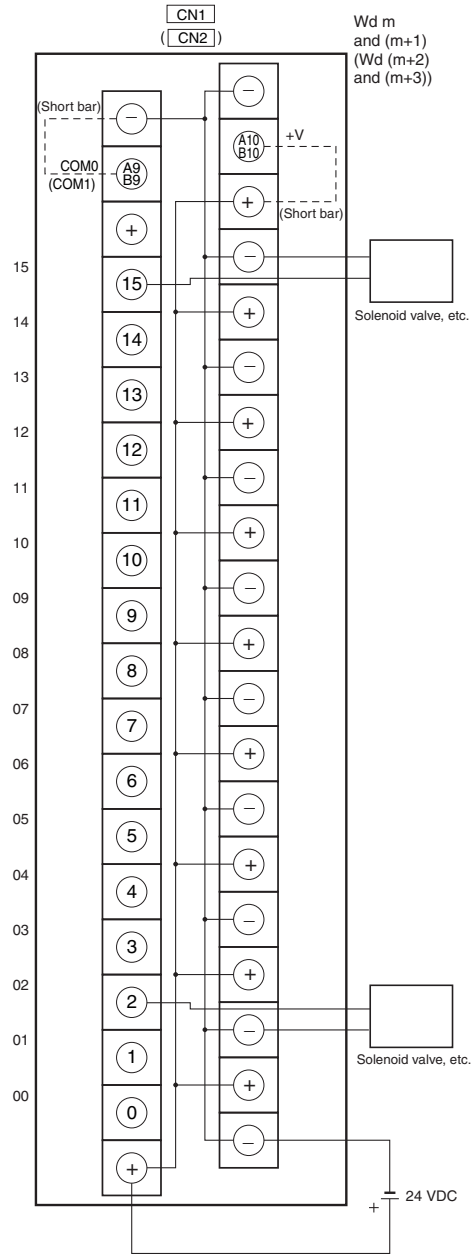
Programmable Controller I/O Unit	CJ1W-OD261
Connector-Terminal Block Conversion Unit	XW2C-20G6-IO16 (2 Units)
Connecting Cables	XW2Z-□□□L
Connection diagram	

Note 1 Connect the A9/B9 terminal and the ⊖ terminal. Connect the A10/B10 terminal and the ⊕ terminal. (Use the enclosed short bar.)

2 The COM terminals are wired inside the Connector-Terminal Block Conversion Unit.

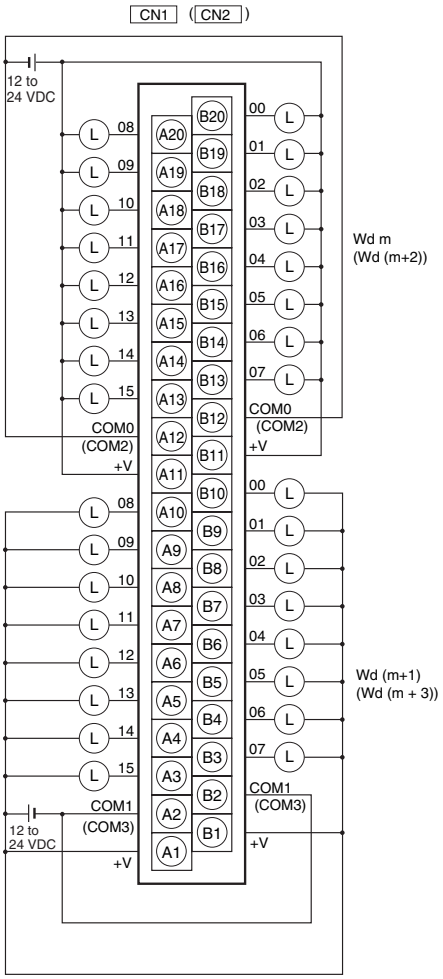
Programmable Controller I/O Unit	CJ1W-OD262
Connector-Terminal Block Conversion Unit	XW2D-40G6
Connecting Cables	XW2Z-□□□K
Connection diagram	

Note The COM (+V) terminals and 0 V terminals are internally connected inside the PLC, but they must all be wired.

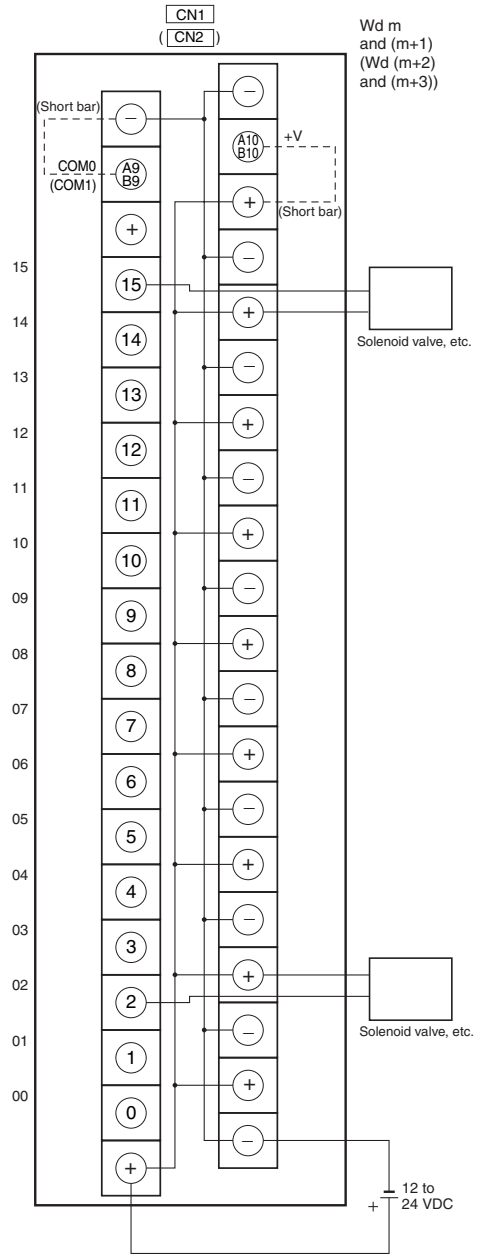
Programmable Controller I/O Unit	CJ1W-OD262
Connector-Terminal Block Conversion Unit	XW2C-20G6-IO16 (2 Units)
Connecting Cables	XW2Z-□□□N
Connection diagram	

Note 1 Connect the A9/B9 terminal and the ⊖ terminal. Connect the A10/B10 terminal and the ⊕ terminal. (Use the enclosed short bar.)

2 The COM terminals are wired inside the Connector-Terminal Block Conversion Unit.

Programmable Controller I/O Unit	CJ1W-OD263
Connector-Terminal Block Conversion Unit	XW2D-40G6
Connecting Cables	XW2Z-□□□K
Connection diagram	

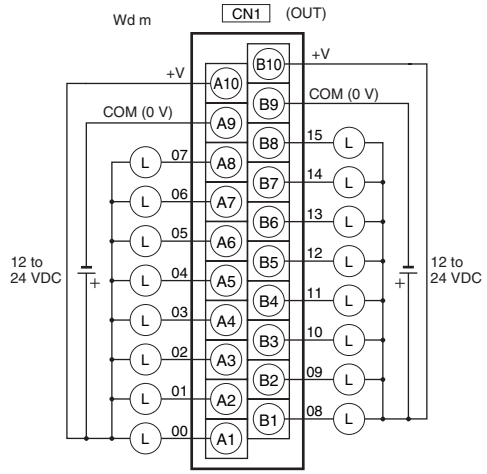
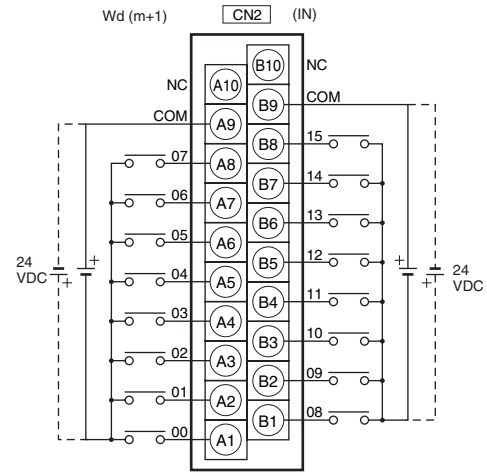
Note The +V terminals and COM terminals are internally connected inside the PLC, but they must all be wired.

Programmable Controller I/O Unit	CJ1W-OD263
Connector-Terminal Block Conversion Unit	XW2C-20G6-IO16 (2 Units)
Connecting Cables	XW2Z-□□□N
Connection diagram	

Note 1 Connect the A9/B9 terminal and the ⊖ terminal. Connect the A10/B10 terminal and the ⊕ terminal. (Use the enclosed short bar.)

2 The COM terminals are wired inside the Connector-Terminal Block Conversion Unit.

● Inputs and Outputs

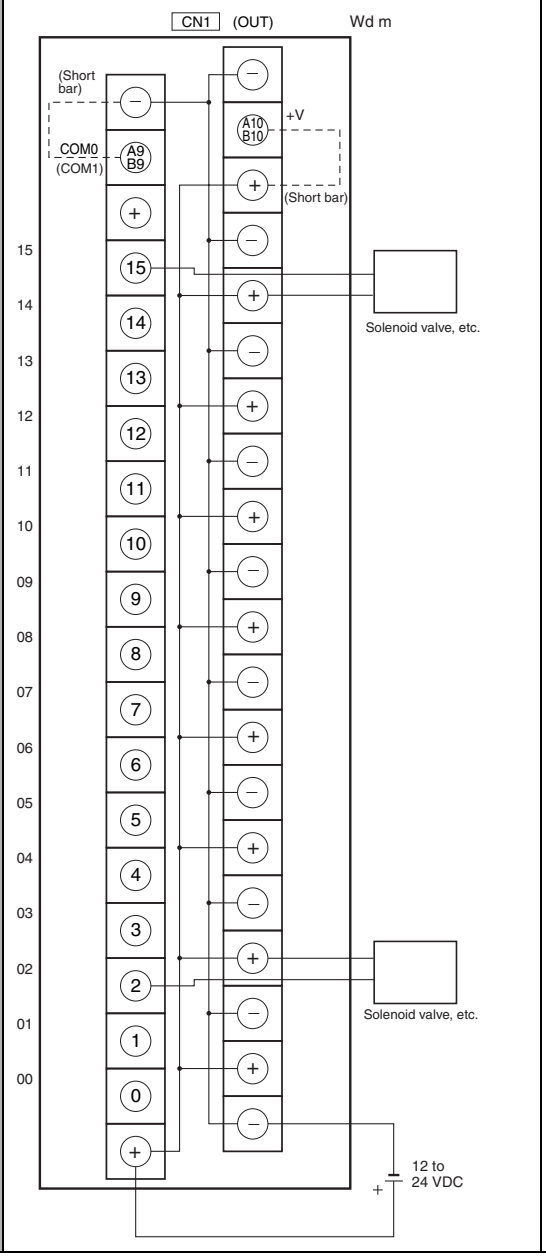
Programmable Controller I/O Unit	CJ1W-MD231
Connector-Terminal Block Conversion Unit	XW2D-20G6
Connecting Cables	XW2Z-□□□A
Connection diagram	 

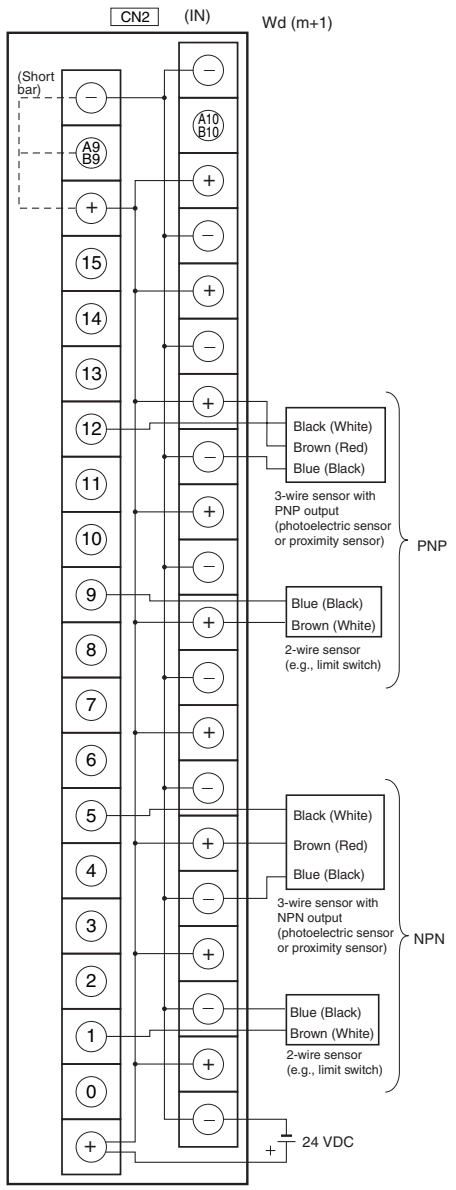
Note 1 The polarity for input power supply connections indicated with dotted lines (- - - - -) can be connected in either direction.

2 The COM terminals are internally connected inside the PLC, but they must all be wired.

Programmable Controller I/O Unit	CJ1W-MD231
Connector-Terminal Block Conversion Unit	XW2C-20G6-IO16
Connecting Cables	XW2Z-□□□A

Connection diagram



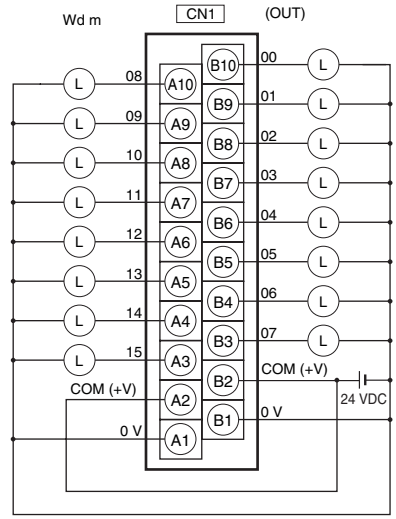
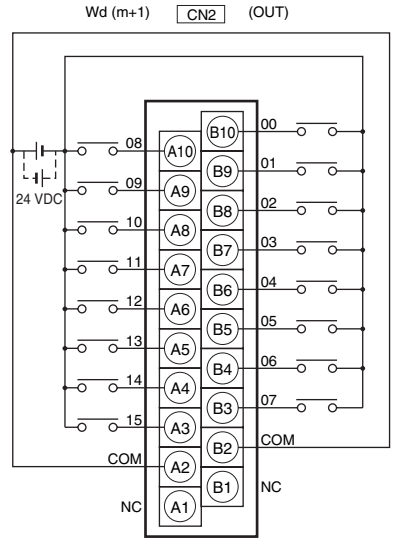


Note 1 Connect the A9/B9 terminal and the ⊖ terminal.
Connect the A10/B10 terminal and the ⊕ terminal.
(Use the enclosed short bar.)

2 The COM terminals are wired inside the Connector-Terminal Block Conversion Unit.

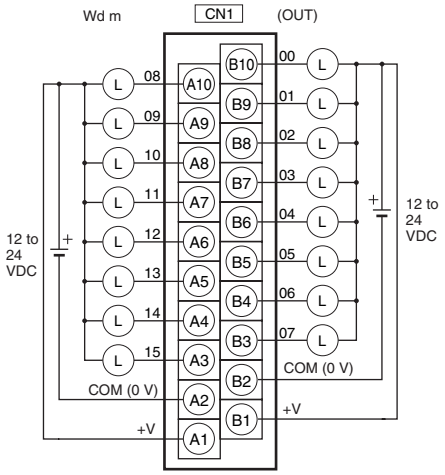
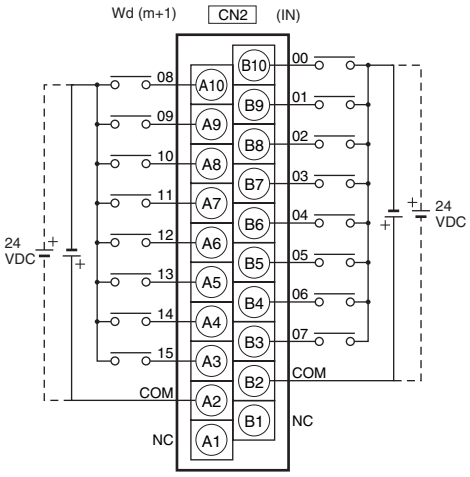
Note 1 Connect the A9/B9 terminal and the ⊕ terminal for NPN.
Connect the A9/B9 terminal and the ⊖ terminal for PNP.
(Use the enclosed short bar.)

2 The COM terminals are wired inside the Connector-Terminal Block Conversion Unit.

Programmable Controller I/O Unit	CJ1W-MD232
Connector-Terminal Block Conversion Unit	XW2D-20G6
Connecting Cables	XW2Z-□□□X
Connection diagram	 

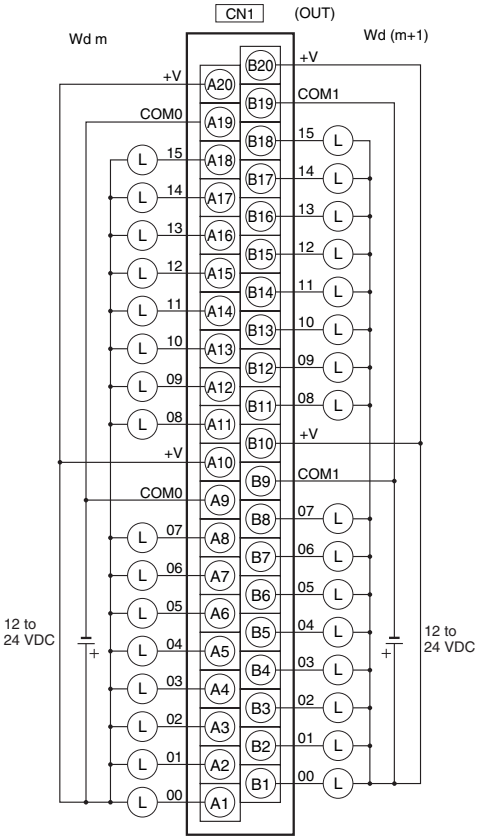
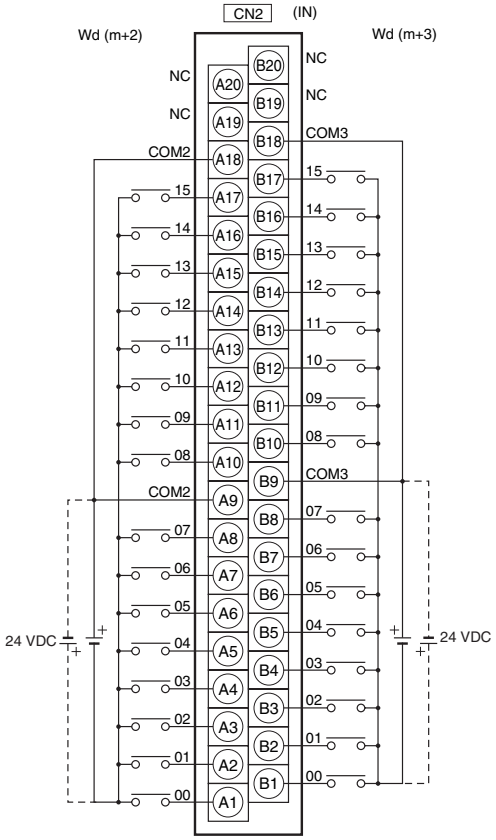
Note 1 The polarity for input power supply connections indicated with dotted lines (_____) can be connected in either direction.

2 The COM terminals and 0V terminal are internally connected inside the PLC, but they must all be wired.

Programmable Controller I/O Unit	CJ1W-MD233
Connector-Terminal Block Conversion Unit	XW2D-20G6
Connecting Cables	XW2Z-□□□X
Connection diagram	 

Note 1 The polarity for input power supply connections indicated with dotted lines (_____) can be connected in either direction.

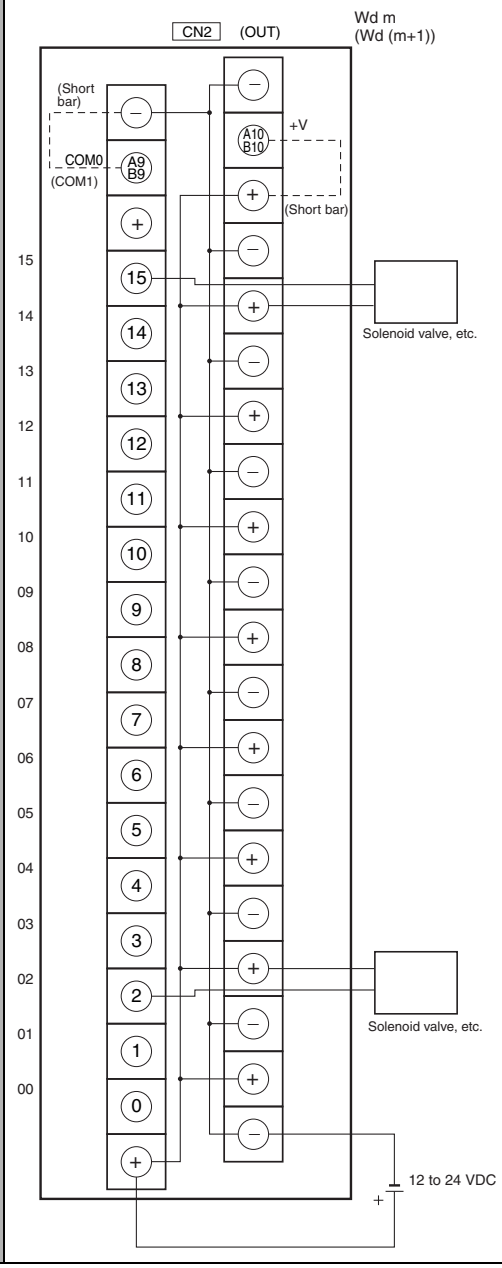
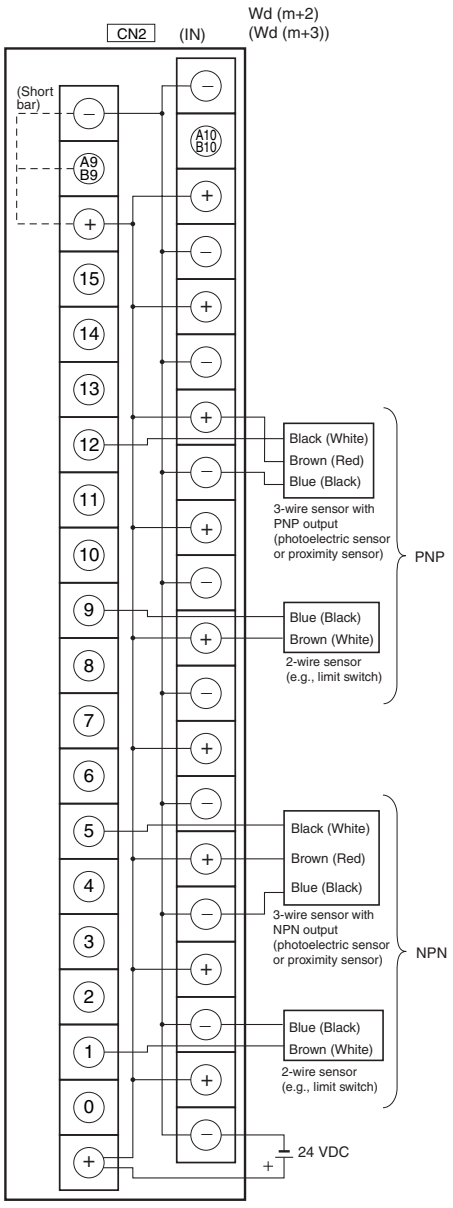
2 The COM terminals and +V terminals are internally connected inside the PLC, but they must all be wired.

Programmable Controller I/O Unit	CJ1W-MD261	
Connector-Terminal Block Conversion Unit	XW2D-40G6 XW2D-40G6RF	
Connecting Cables	XW2Z-□□□B	
Connection diagram		

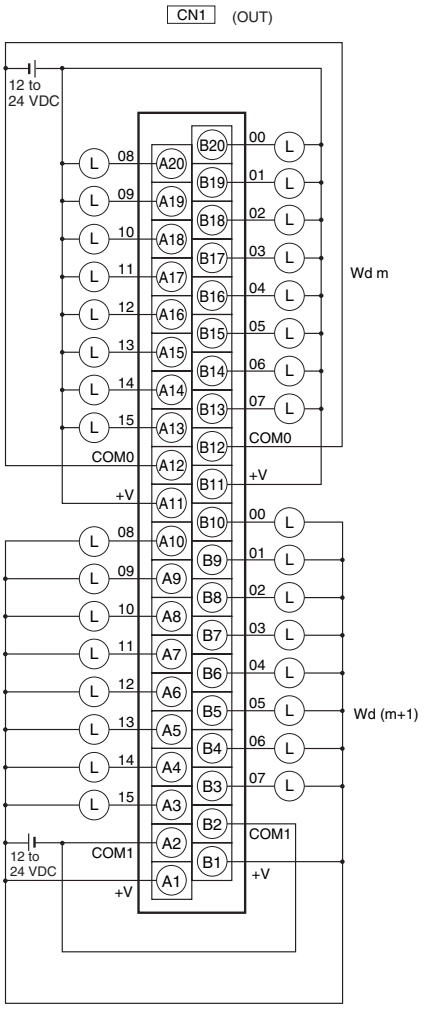
Note The +V terminals and COM terminals are internally connected inside the PLC, but they must all be wired.

Note 1 The polarity for input power supply connections indicated with dotted lines (_____) can be connected in either direction provided that the same polarity is used for the commons for rows A and B.

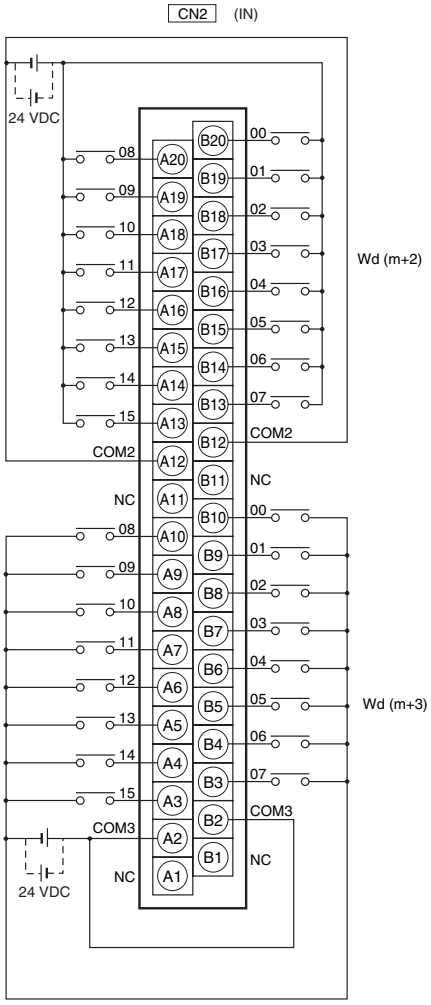
2 Both COM2 and COM3 have two pins each. They are internally connected inside the PLC, but they must all be wired.

Programmable Controller I/O Unit	CJ1W-MD261	
Connector-Terminal Block Conversion Unit	XW2C-20G6-IO16 (2 Units)	XW2C-20G6-IO16 (2 Units)
Connecting Cables	XW2Z-□□□L	XW2Z-□□□D
Connection diagram		
	Note 1 Connect the A9/B9 terminal and the ⊖ terminal. Connect the A10/B10 terminal and the ⊕ terminal. (Use the enclosed short bar.) **2** The COM terminals are wired inside the Connector-Terminal Block Conversion Unit.	**Note 1** Connect the A9/B9 terminal and the ⊕ terminal for NPN. Connect the A9/B9 terminal and the ⊖ terminal for PNP. (Use the enclosed short bar.) **2** The COM terminals are wired inside the Connector-Terminal Block Conversion Unit.

Programmable Controller I/O Unit	CJ1W-MD263
Connector-Terminal Block Conversion Unit	XW2D-40G6 XW2D-40G6-RM
Connecting Cables	XW2Z-□□□K
Connection diagram	

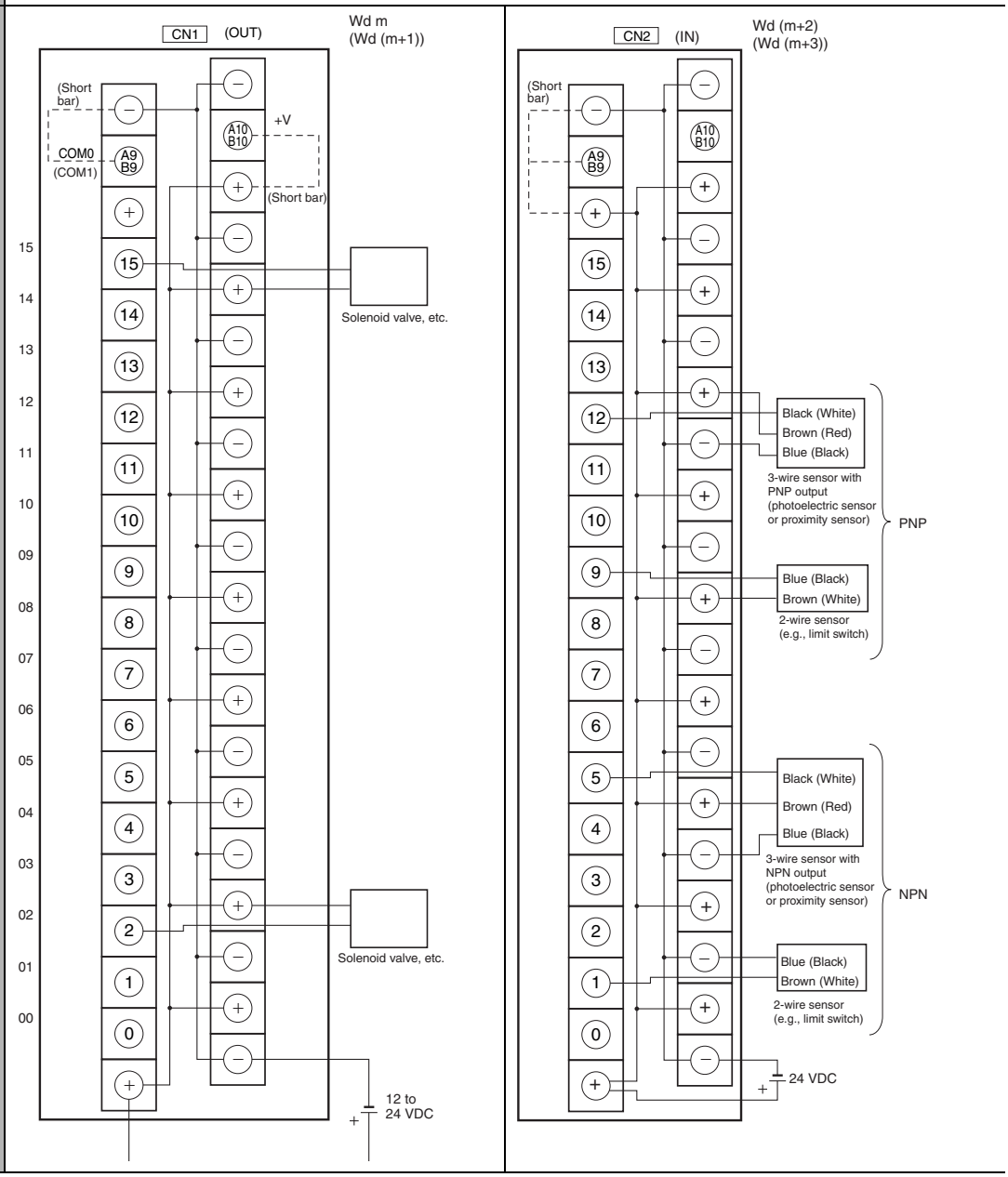


Note The +V terminals and COM terminals are internally connected inside the PLC, but they must all be wired.



Note 1 The polarity for input power supply connections indicated with dotted lines (_____) can be connected in either direction.

2 Both COM2 and COM3 have two pins each. They are internally connected inside the PLC, but they must all be wired.

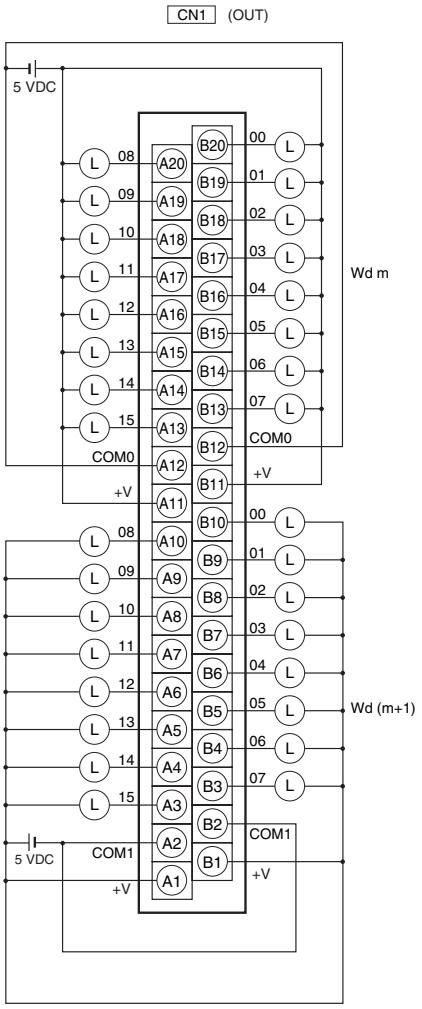
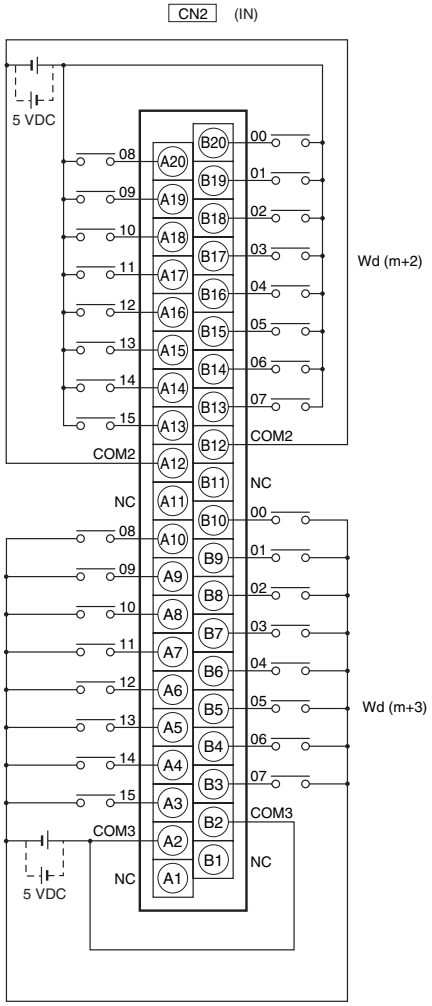
Programmable Controller I/O Unit	CJ1W-MD263
Connector-Terminal Block Conversion Unit	XW2C-20G6-IO16 (2 Units)
Connecting Cables	XW2Z-□□□N
Connection diagram	

Note 1 Connect the A9/B9 terminal and the ⊖ terminal.
Connect the A10/B10 terminal and the ⊕ terminal.
(Use the enclosed short bar.)

2 The COM terminals are wired inside the Connector-Terminal Block Conversion Unit.

Note 1 Connect the A9/B9 terminal and the ⊕ terminal for NPN.
Connect the A9/B9 terminal and the ⊖ terminal for PNP.
(Use the enclosed short bar.)

2 The COM terminals are wired inside the Connector-Terminal Block Conversion Unit.

Programmable Controller I/O Unit	CJ1W-MD563	
Connector-Terminal Block Conversion Unit	XW2D-40G6 XW2D-40G6-RM	
Connecting Cables	XW2Z-□□□K	
Connection diagram		
	Note 1 The +V terminals and COM terminals are internally connected inside the PLC, but they must all be wired. **2** The power supply voltage for the CJ1W-MD563 is 5 V.	**Note 1** The COM terminals are internally connected inside the PLC, but they must all be wired. **2** The power supply voltage for the CJ1W-MD563 is 5 V.

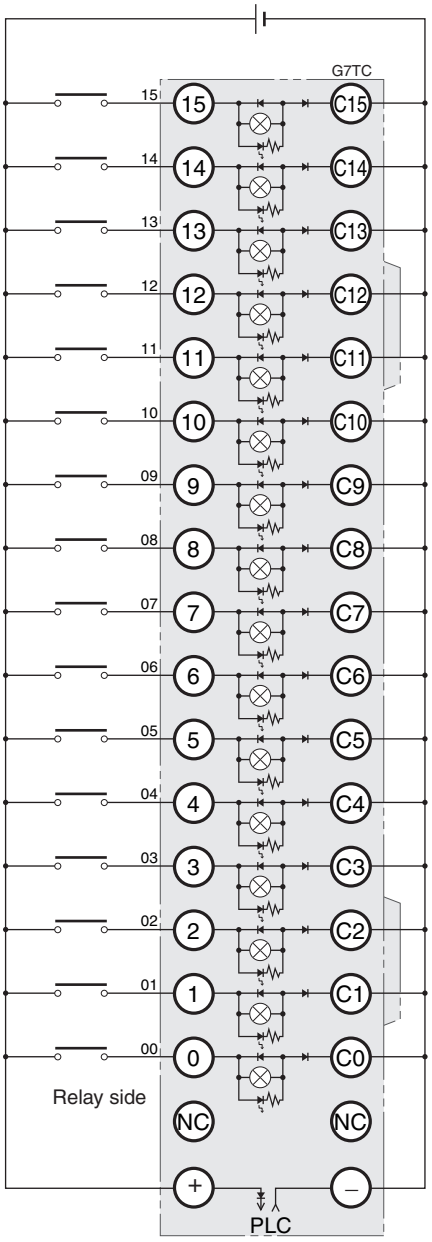
Connection Diagrams for I/O Relay Terminals

Connection examples and internal connection diagrams for I/O Relay Terminals connected to Basic I/O Units are shown below.

● Inputs

G7TC I/O Relay Terminals

G7TC-ID16

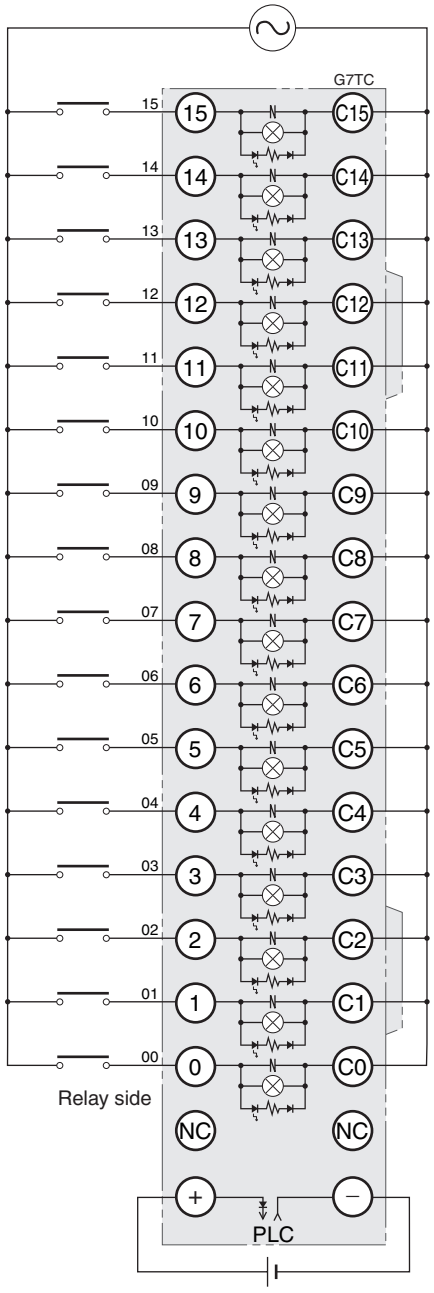


TOP VIEW

Note 1 Inputs to the PLC Input Units and I/O Relay Terminals use isolated contacts. “00” to “15” are the input bit numbers for the PLC Input Unit and the input numbers for the I/O Relay Terminal.

2 Use the G78-04 short bar to short to the common terminal.

G7TC-IA16



TOP VIEW

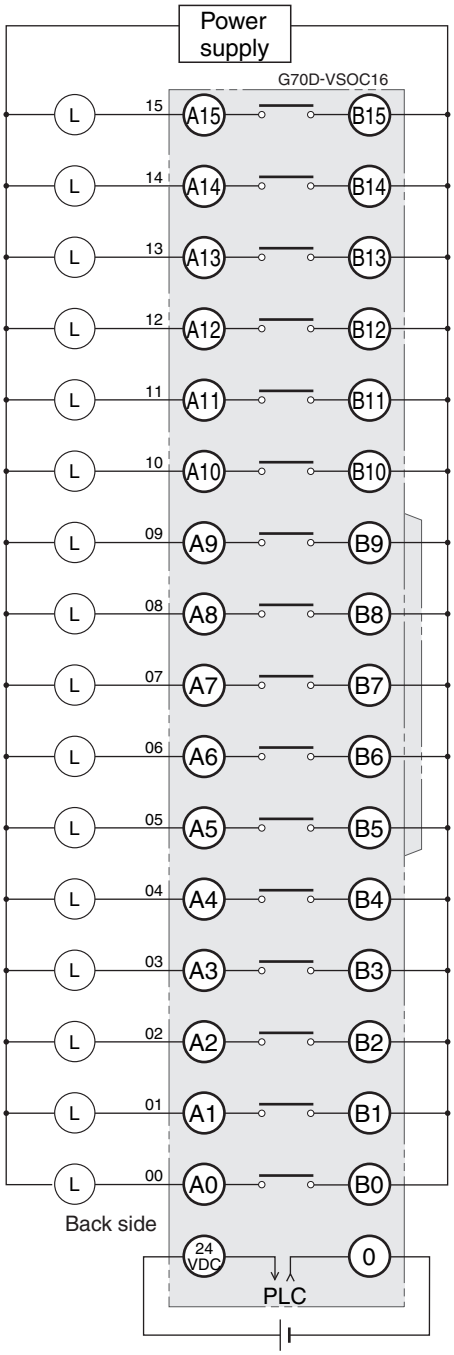
Note 1 Inputs to the PLC Input Units and I/O Relay Terminals use isolated contacts. “00” to “15” are the input bit numbers for the PLC Input Unit and the input numbers for the I/O Relay Terminal.

2 Use the G78-04 short bar to short to the common terminal.

● Outputs

G70D-V Relay Terminals

G70D-VSOC16

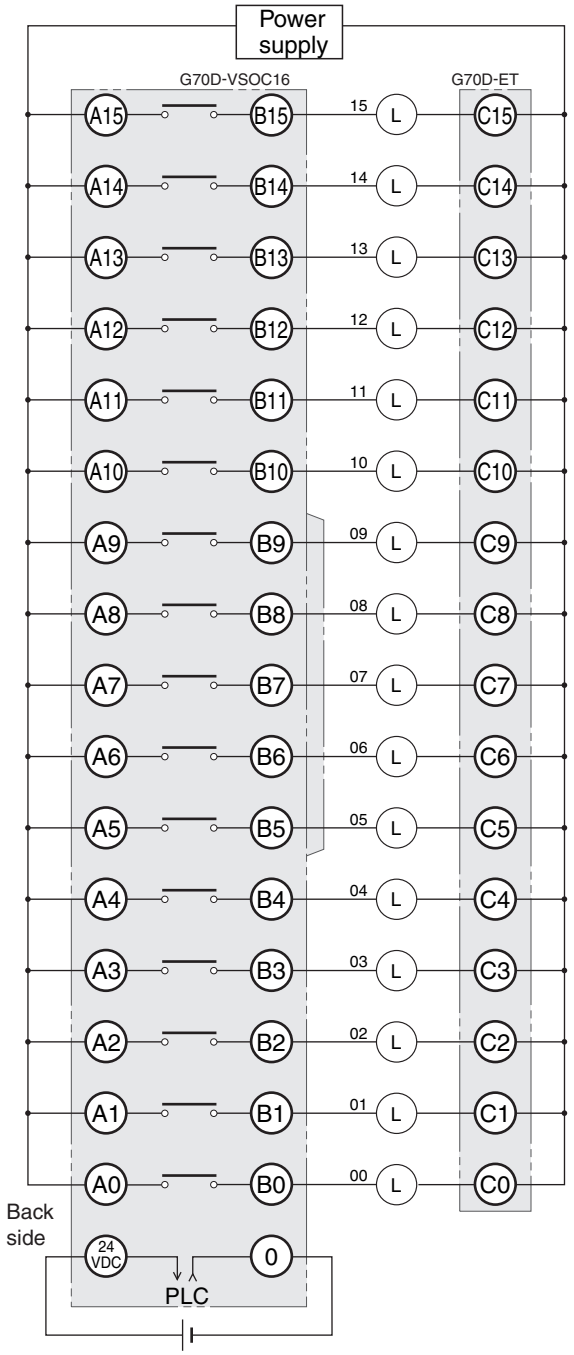


TOP VIEW

Note 1 All outputs are independent. Outputs on the PLC Output Unit and I/O Relay Terminal are isolated. “00” to “15” are the output bit numbers for the PLC Output Unit and the output numbers for the I/O Relay Terminal.

2 Use the G6D-4-SB short bar to short to the common terminal.

G70D-VSOC16+G70D-ET



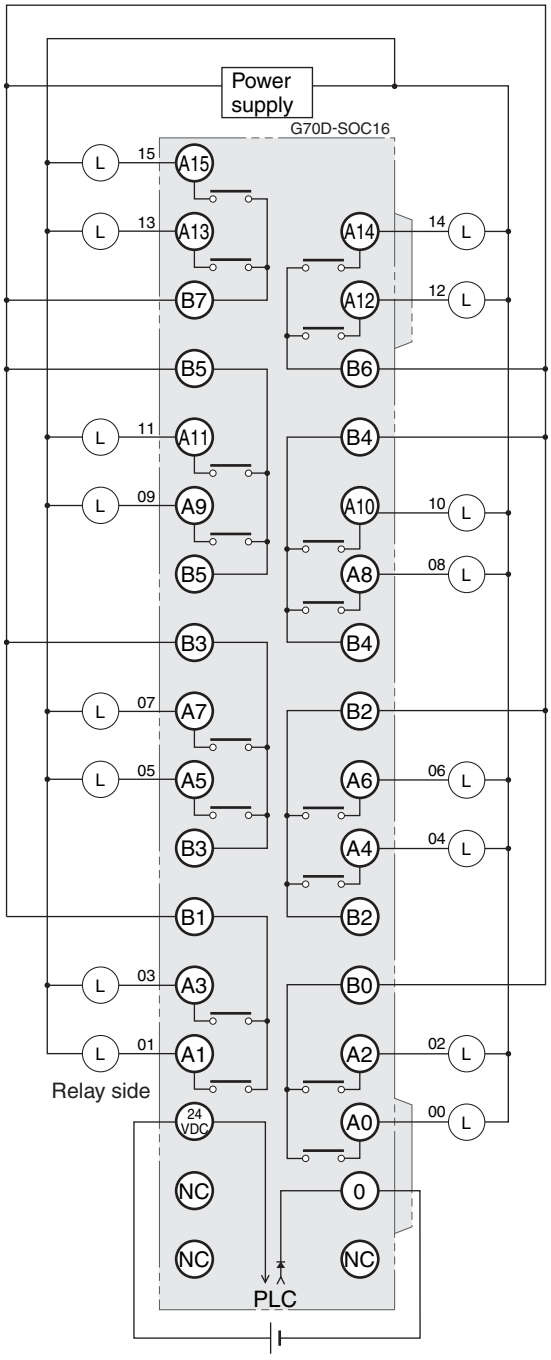
TOP VIEW

Note 1 All outputs are independent. Outputs on the PLC Output Unit and I/O Relay Terminal are isolated. “00” to “15” are the output bit numbers for the PLC Output Unit and the output numbers for the I/O Relay Terminal.

2 Use the G6D-4-SB short bar to short to the common terminal.

G70D Relay Terminals

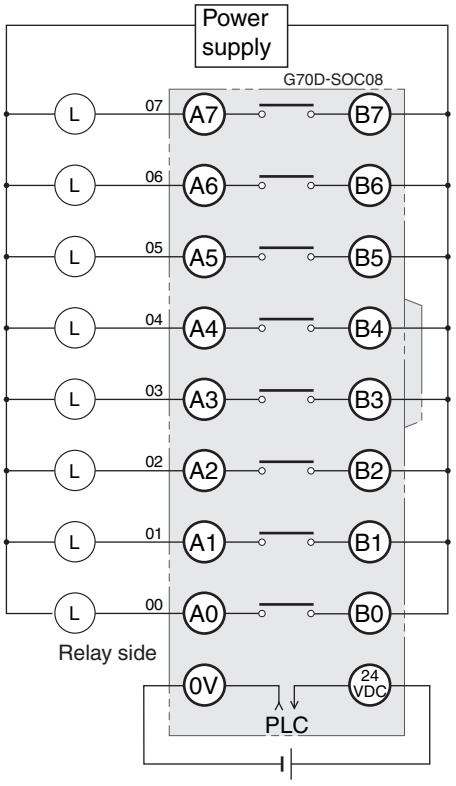
G70D-SOC16



TOP VIEW

Note Every two outputs share a common. The current supplied is 3 A per common. Outputs on the PLC Output Unit and I/O Relay Terminal are isolated. “00” to “15” are the output bit numbers for the PLC Output Unit and the output numbers for the I/O Relay Terminal.

G70D-SOC08



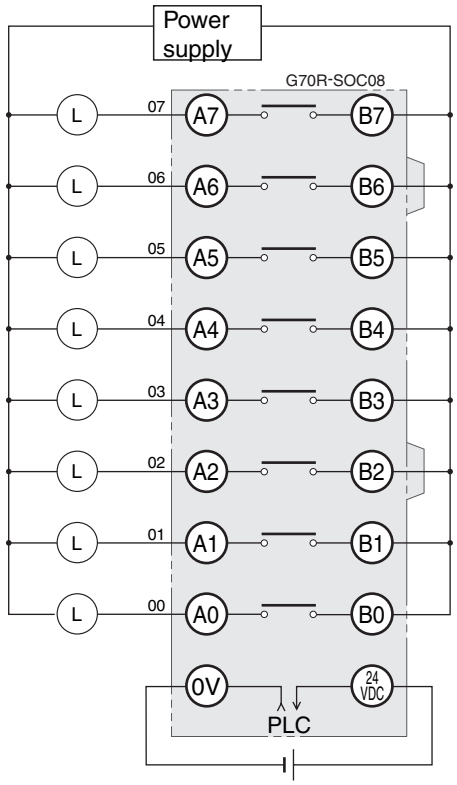
TOP VIEW

Note **1** All outputs are independent. Outputs on the PLC Output Unit and I/O Relay Terminal are isolated. “00” to “07” are the output bit numbers for the PLC Output Unit and the output numbers for the I/O Relay Terminal.

2 Use the G6D-4-SB short bar to short to the common terminal.

G70R Relay Terminals

G70R-SOC08



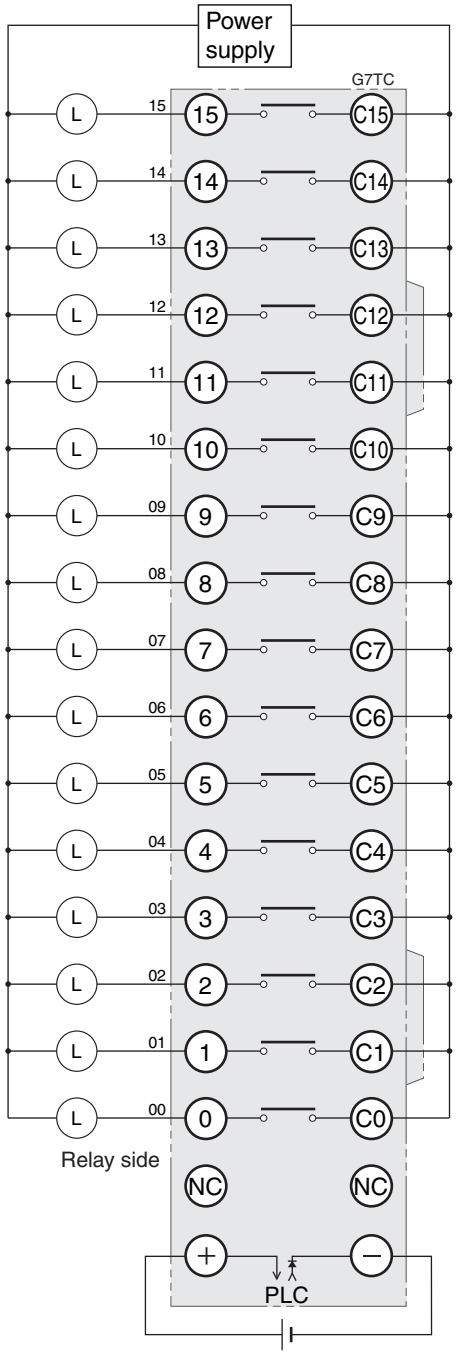
TOP VIEW

Note 1 All outputs are independent. Outputs on the PLC Output Unit and I/O Relay Terminal are isolated. “00” to “07” are the output bit numbers for the PLC Output Unit and the output numbers for the I/O Relay Terminal.

2 Use the G6D-4-SB short bar to short to the common terminal.

G7TC I/O Relay Terminals

G7TC-OC16/OC08



TOP VIEW

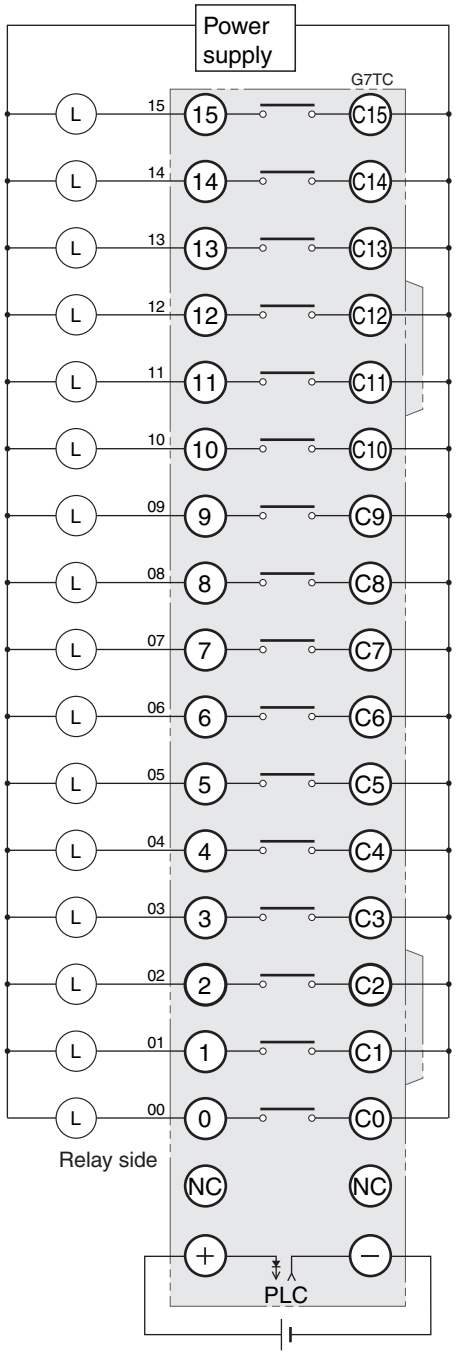
Note 1 All outputs are independent. Outputs on the PLC Output Unit and I/O Relay Terminal are isolated. “00” to “15” are the output bit numbers for the PLC Output Unit and the output numbers for the I/O Relay Terminal.

2 The G7TC-OC08 has only 8 outputs and therefore does not have 8 to 15 and C8 to C15.

3 Use the G78-04 short bar to short to the common terminal.

G7TC I/O Relay Terminals

G7TC-OC16-1

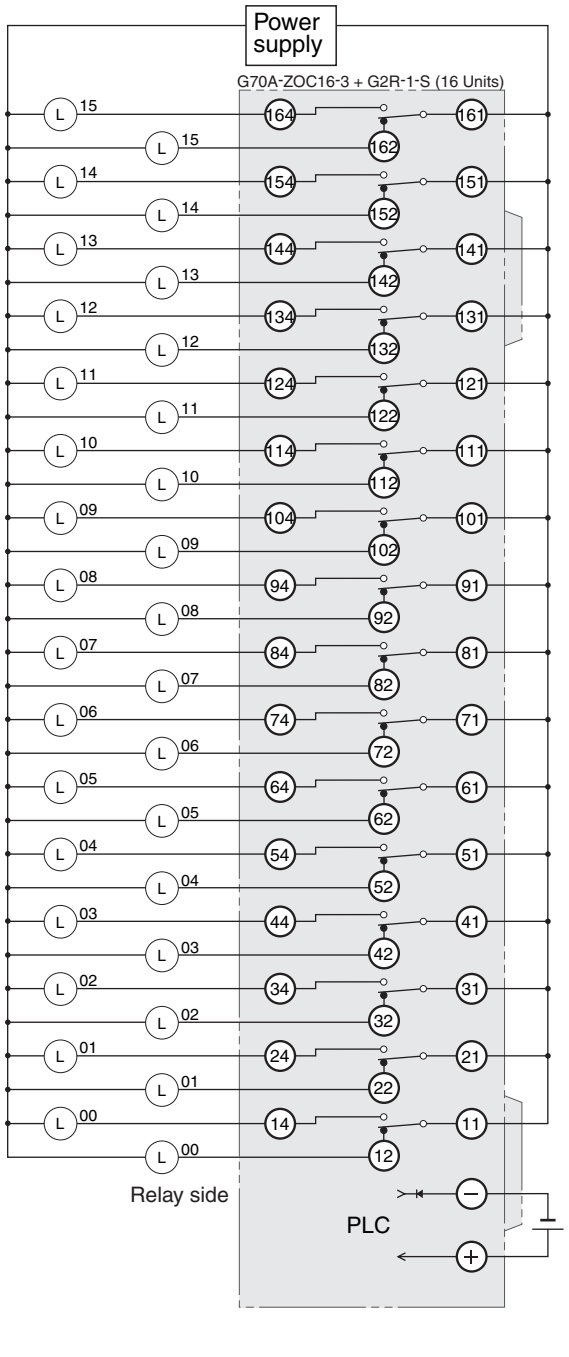


Note 1 All outputs are independent. Outputs on the PLC Output Unit and I/O Relay Terminal are isolated. “00” to “15” are the output bit numbers for the PLC Output Unit and the output numbers for the I/O Relay Terminal.

2 Use the G78-04 short bar to short to the common terminal.

G70A-ZOC16 Relay Terminal Socket

G70A-ZOC16-3+G2R-1-S (16 Units)

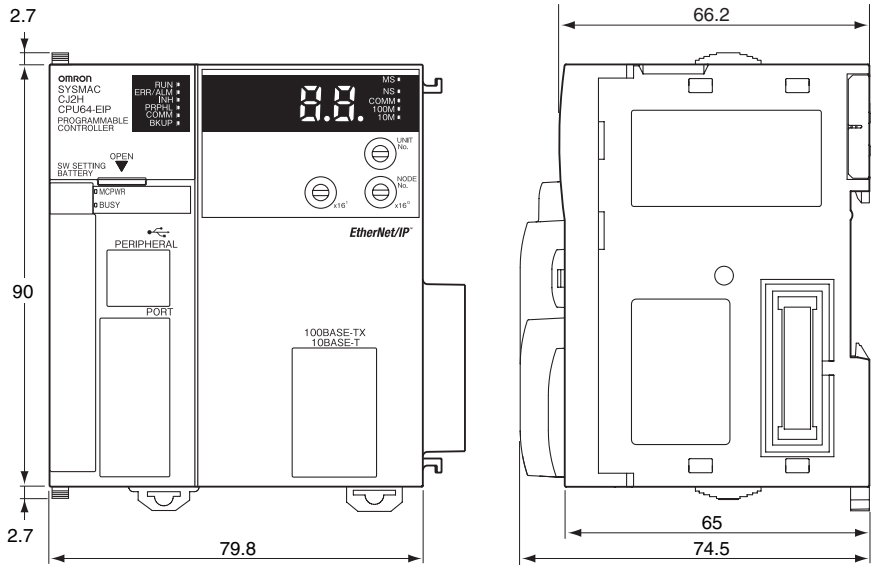


Note 1 The above diagram is an example with the G2R-1-S(N) mounted to the 70A-ZOC16-3.

2 All outputs are independent. Outputs on the PLC Output Unit and I/O Relay Terminal are isolated. “00” to “15” are the output bit numbers for the PLC Output Unit and the output numbers for the I/O Relay Terminal.

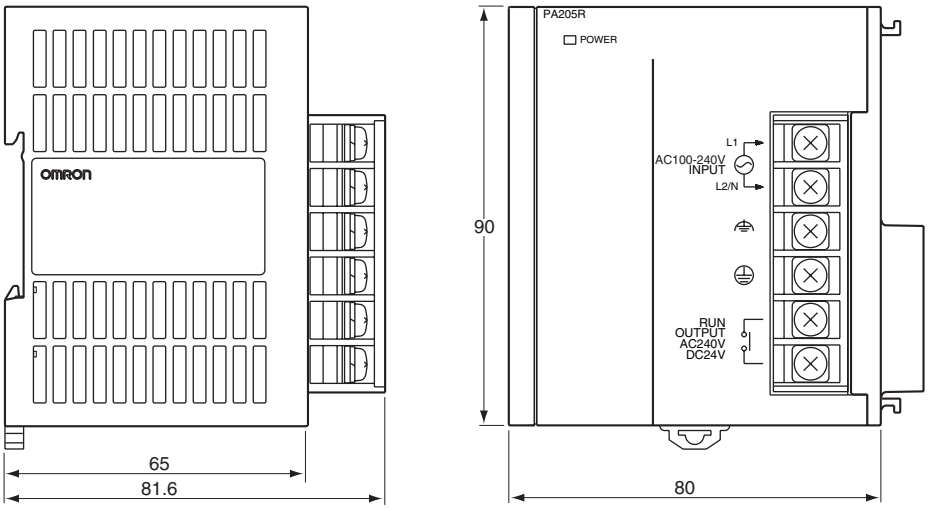
A-2 Dimensions

A-2-1 CJ2H CPU Units

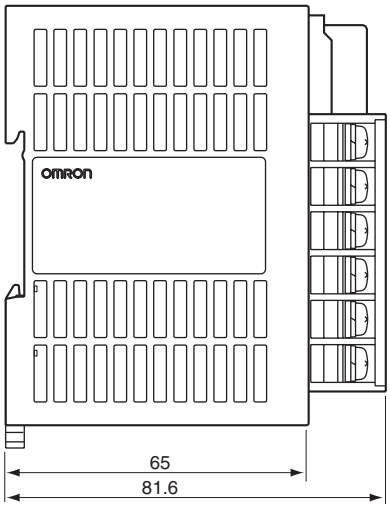


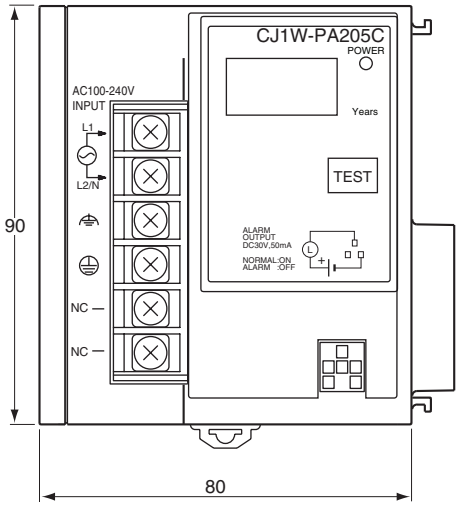
A-2-2 Power Supply Units

CJ1W-PA205R

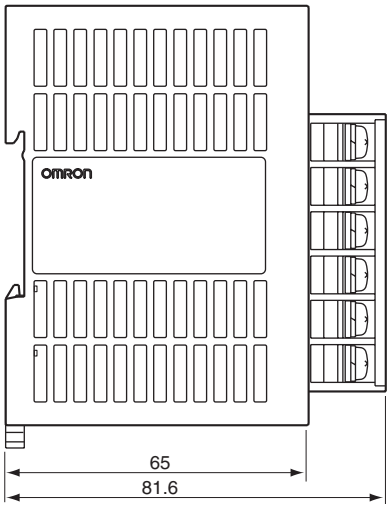


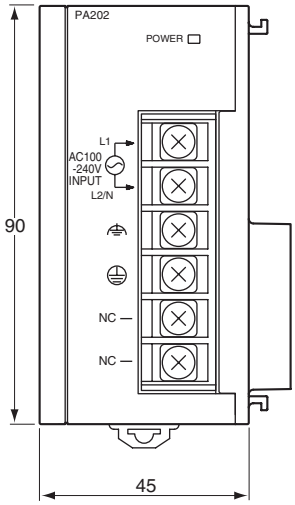
CJ1W-PA205C



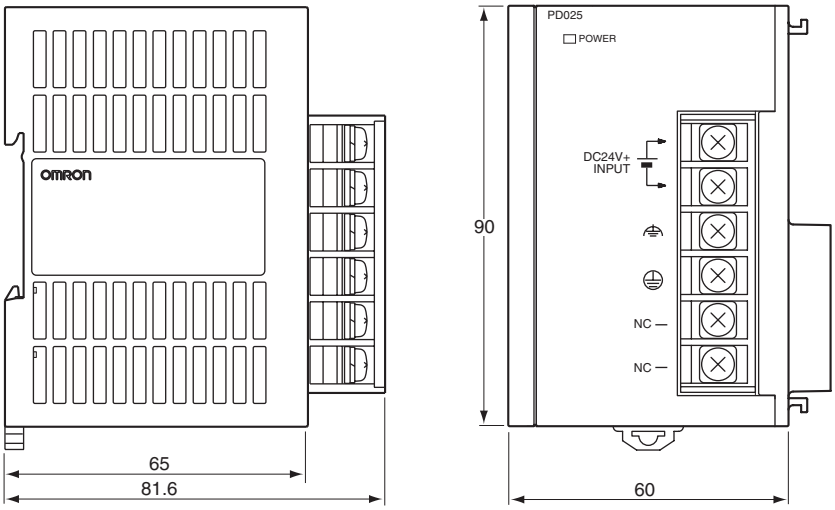


CJ1W-PA202

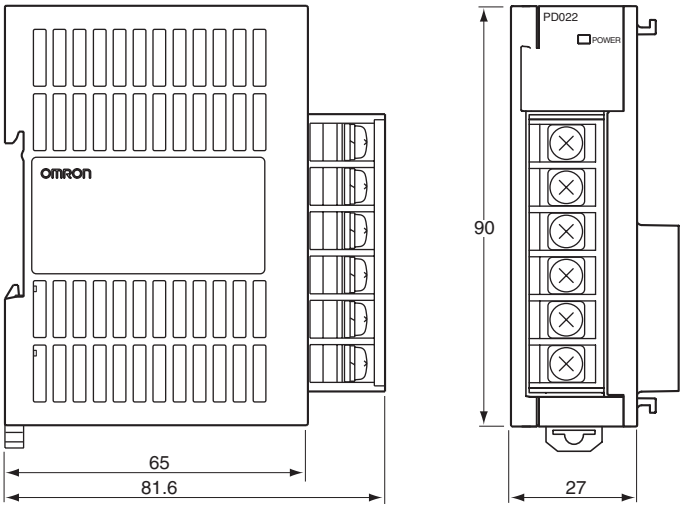




CJ1W-PD025

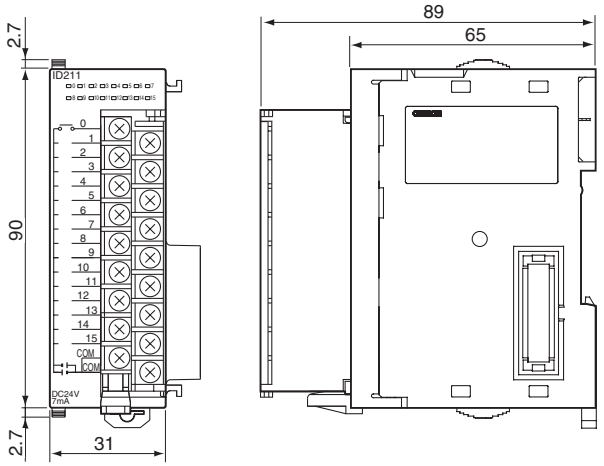


CJ1W-PD022



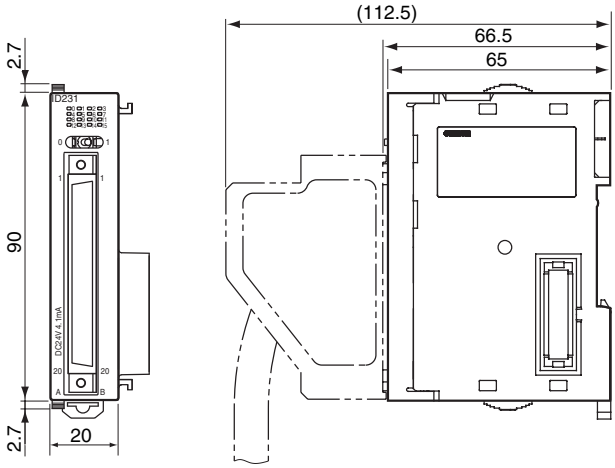
A-2-3 Basic I/O Units

Eight/Sixteen-point Units with 18-terminal Terminal Blocks

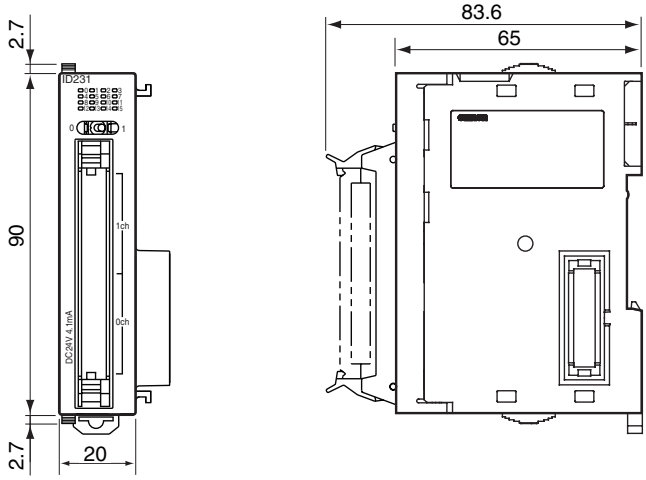


32-point Units (Input Units and Output Units)

Units with Fujitsu-compatible Connector (40-pin x 1)

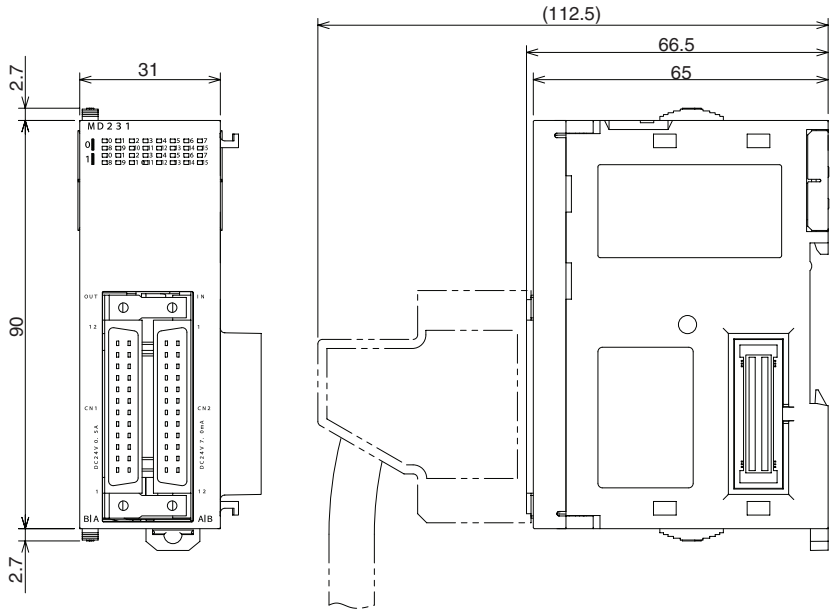


Units with MIL Connector (40-pin x 1)

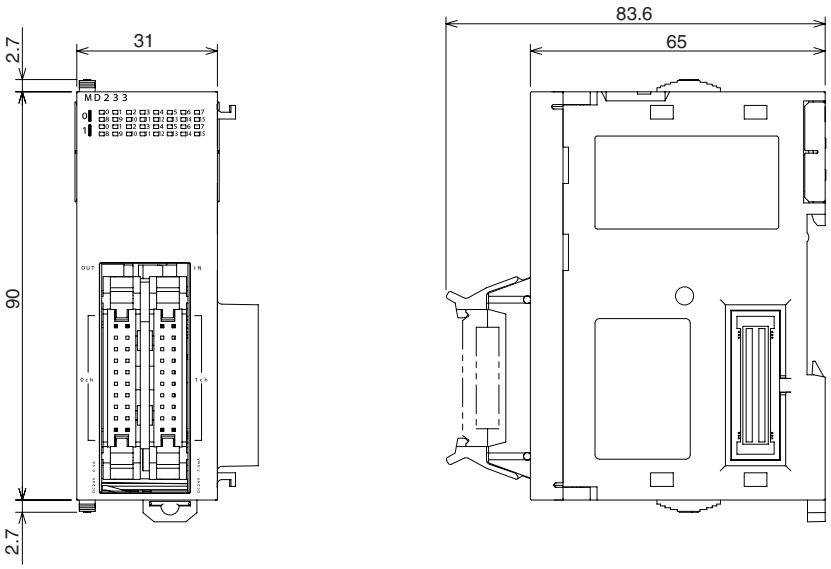


32-point Units (24-VDC Input/Transistor Output Units)

Units with Fujitsu-compatible Connector (24-pin x 2)

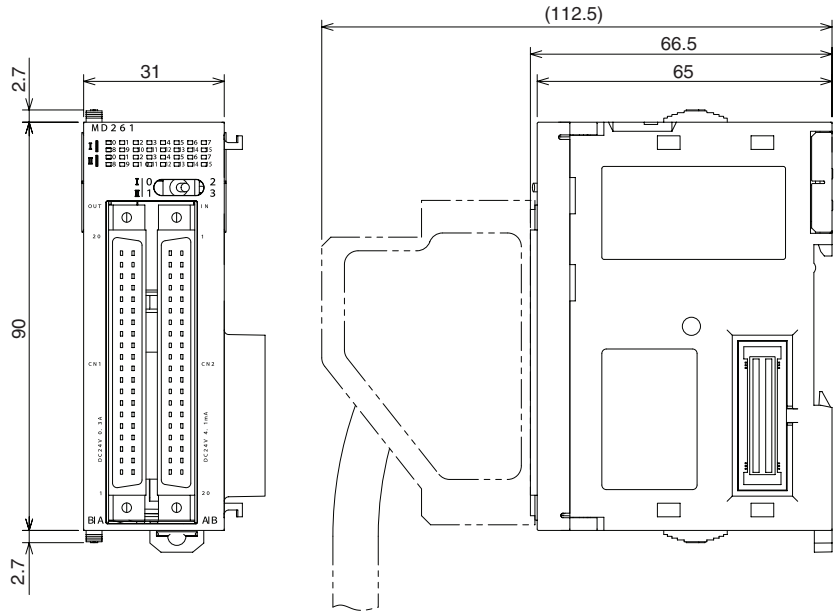


Units with MIL Connector (20-pin x 2)

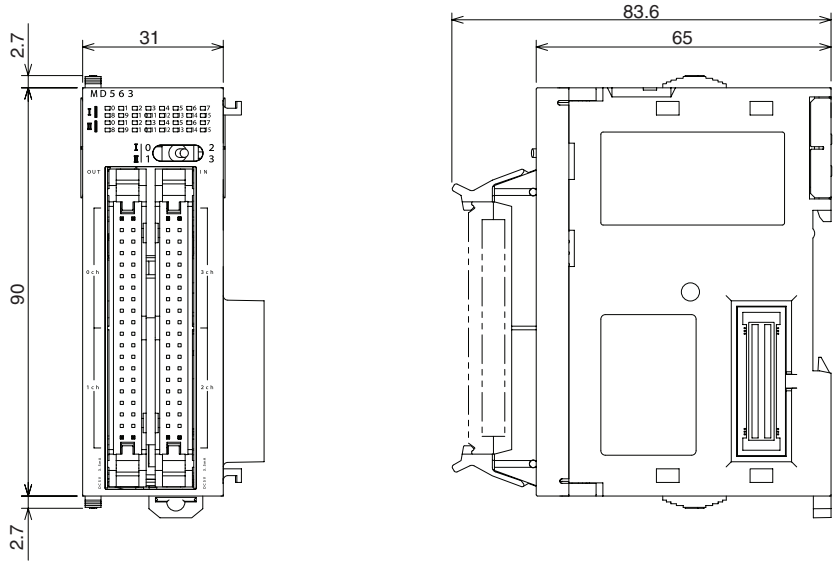


64-point Units (Input Units, Output Units, 24-VDC Input/Transistor Output Units, TTL I/O Units)

Units with Fujitsu-compatible Connector (40-pin x 2)

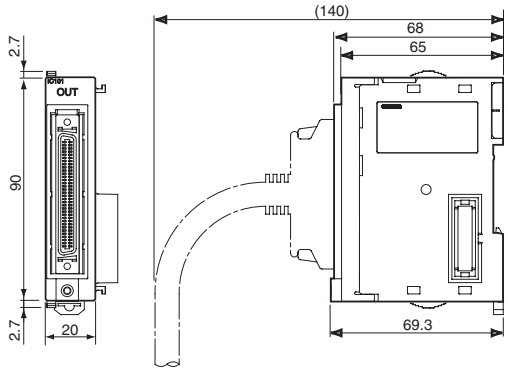


Units with MIL Connector (40-pin x 2)

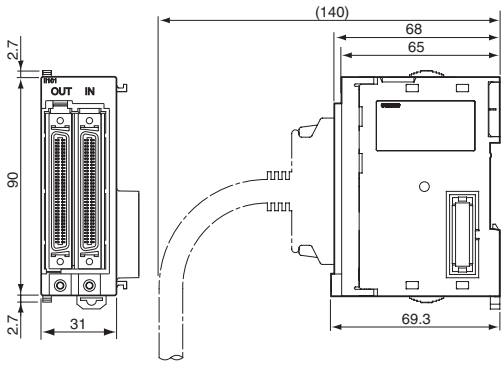


A-2-4 I/O Control Unit and I/O Interface Unit

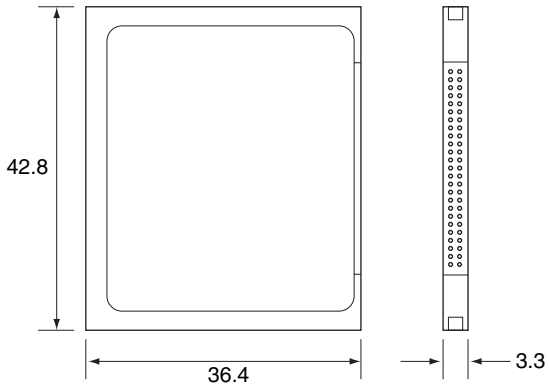
CJ1W-IC101
I/O Control Unit



CJ1W-II101
I/O Interface Unit



A-2-5 I/O Memory Card



A-3 Fatal and Non-fatal Error Details

This appendix describes the fatal and non-fatal errors that can occur in the CPU Unit.

A-3-1 Fatal Errors

Operation will stop if a fatal error occurs. Information on the fatal error is displayed on the Error Tab Page opened from the CX-Programmer's PLC Error Window. Check the details on the error based on the message that is displayed, and the error flags and error information in the Auxiliary Area, and take suitable countermeasures. The following list shows the fatal errors.

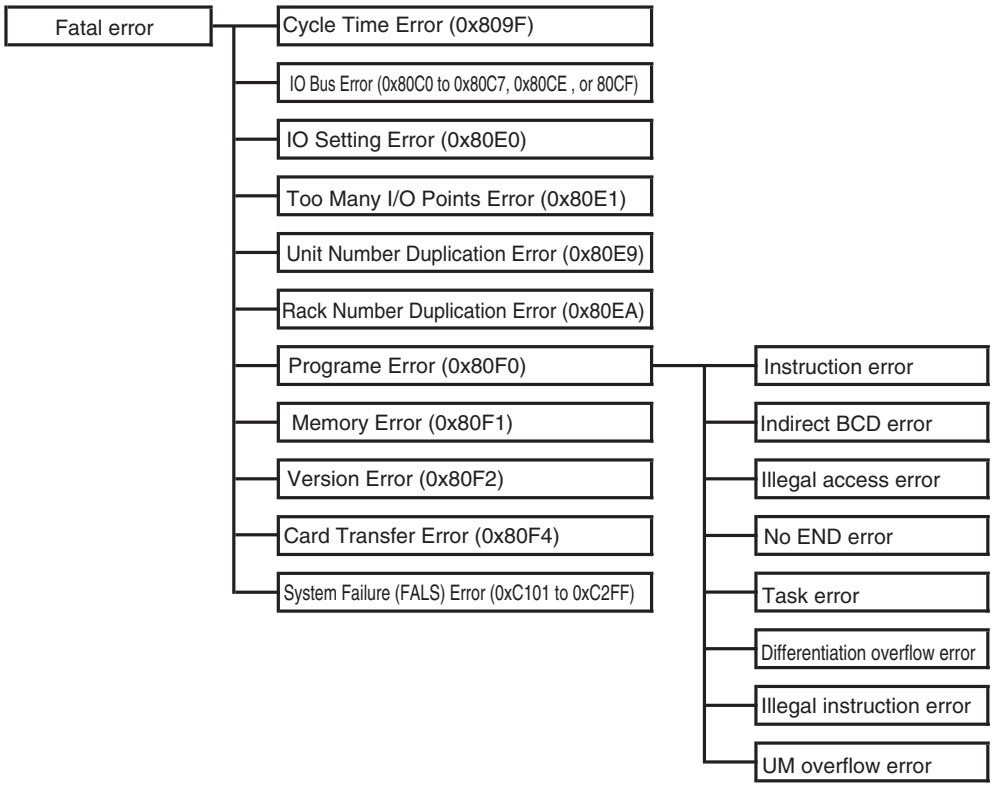


Table of Fatal Errors

- The table of fatal errors is arranged in ascending order of error codes.
- When two or more errors occur at the same time, the error code of the more serious error will be recorded in A400.
- If the IOM Hold Bit hasn't been turned ON to protect I/O memory, all nonretained areas of I/O memory will be cleared when a fatal error other than FALS(007) occurs.
- If the IOM Hold Bit is ON, the contents of I/O memory will be retained but all outputs will be turned OFF.

Error	Error code (inA400)	Error flag (Auxiliary Area)	Flag and word data	Probable cause	Possible remedy
Cycle Time Error	0x809F	A401.08: Cycle Time Too Long Flag	---	The cycle time has exceeded the maximum cycle time (watch cycle time) set in the PLC Setup.	Change the program to reduce the cycle time or change the maximum cycle time setting. Check the Maximum Interrupt Task Processing Time in A440 and see if the Cycle Time Watch Time can be changed. The cycle time can be reduced by dividing unused parts of the program into tasks, jumping unused instructions in tasks, and disabling cyclic refreshing of Special I/O Units that don't require frequent refreshing.
IO Bus Error	0x80C0 to 0x80C7, 0x80CE, or 0x80CF	A401.14: I/O Bus Error Flag	A404: I/O Bus Error Slot and Rack Numbers	Error has occurred in the bus line between the CPU and I/O Units or the End Cover is not connected to the CPU Rack or an Expansion Rack.*2 A404.08 to A404.15 contain the error rack number (00 to 03) in binary. 0F hex indicates that the rack cannot be determined.0E hex indicates the End Cover is not connected to the CPU Rack or an Expansion Rack.	Try turning the power OFF and ON again. If the error isn't corrected, turn the power OFF and check cable connections between the I/O Units and Racks and the End Covers. Check for damage to the cable or Units. Turn the Rack's power supply OFF and then ON again.
IO Setting Error	0x80E0	A401.10: I/O Setting Error Flag	A405.08	The Units that are connected do not agree with the registered I/O tables or the number of Units that are connected does not agree with the number in the registered I/O table.*2	• If the number of Units is not correct, turn OFF the power supply and correctly connect the proper Units. • With the CJ2 CPU Unit, if the I/O verification operation*1 is performed when the number of Units is incorrect, mismatch errors will be detected for all Units registered in the I/O tables. If this occurs even when the number of Units is correct, it is possible that a Unit has failed and is not being correctly recognized. Generate new I/O tables, and then read the I/O tables and check for Units that are not being recognized. • If the number of Units is correct, confirm the Unit in discrepancy, turn OFF the power supply, and then correct the Unit connections. • If there is a mistake in the I/O tables, generate new I/O tables or edit the tables to correct the mistake.
				An Interrupt Input Unit has been mounted in the wrong position, i.e., not in one of the four positions to the right of the CPU Unit (slots 0 to 3 on the CPU Rack), or has been registered in the registered I/O tables in the wrong position.	• When an Interrupt Input Unit is used, A40508 will turn ON if the Interrupt Input Unit is in the wrong position or is registered in the wrong position. • If the Unit is mounted in a slot on the CPU Rack that is other than slots 0 to 3, mount the Unit in one of these four slots. • If the Unit is mounted in one of the correct slots (0 to 3) on the CPU Rack, generate a new I/O table or edit the I/O table so that the Unit will be correctly registered to one of these slots.

Error	Error code (inA400)	Error flag (Auxiliary Area)	Flag and word data	Probable cause	Possible remedy
Too Many I/O Points Error	0x80E1	A401.11: Too Many I/O Points Flag	A407.13 to A407.15: Too Many I/O Points, Details 1, 2	One of the following values exceeds the maximum or is allocated to more than one Unit. 1. The total number of I/O points set in the I/O tables exceeds the maximum allowed for the CPU Unit (bits: 000) 2. There are more than 32 interrupt inputs (bits: 001). 3. The number of Expansion Racks exceeds the maximum (bits: 101). 4. More than 10 I/O Units are connected to one Rack (bits: 111).*4	Correct the problem and then turn the power supply OFF and back ON.
Unit/Rack Number Duplication Error	0x80E9	A401.13: Duplication Error Flag	A410: CPU Bus Unit Duplicated Number Flags	The same number has been allocated to more than one CPU Bus Unit.*5	Check the unit numbers, eliminate the duplications, and turn the Rack's power supply OFF and then ON again.
			A411 to A416: Special I/O Unit Duplicated Number Flags	The same number has been allocated to more than one Special I/O Unit.*6	Check the unit numbers, eliminate the duplications, and turn the Rack's power supply OFF and then ON again.
	0x80EA		A409: Expansion Rack Duplicated Rack Number	The same I/O word has been allocated to more than one Basic I/O Unit.	Check allocations to Units on the rack number whose bit is ON in A409.00 to A409.03. Correct the allocations so that no words are allocated more than once, including to Units on other Racks, and turn the Rack's power supply OFF and then ON again.
				An Expansion Rack's starting word address exceeds CIO 0901.The corresponding bit in A409.00 to A409.03 (Racks 0 to 3) will be turned ON.	Check the first word setting for the Rack indicated in A409.00 to A409.03 and change the setting to a valid word address below CIO 0900 with a Programming Device (such as a CX-Programmer).

Error	Error code (inA400)	Error flag (Auxiliary Area)	Flag and word data	Probable cause	Possible remedy
Program Error	0x80F0	A401.09: Program Error Flag	A294 to A299: Program Error Information	The program is incorrect. See the following rows of this table for details. The address at which the program stopped will be output to A298 and A299.	Check A295 to determine the type of error that occurred and check A298/A299 to find the program address where the error occurred. Correct the program and then clear the error.
				A295.11: No END error	Be sure that there is an END(001) instruction at the end of the task specified in A294 (program stop task number).
				A295.15: UM overflow error The last address in UM (user program memory) has been exceeded.	Transfer the program again.
				A295.13: Differentiation overflow error Too many differentiated instructions have been inserted or deleted during online editing.	Return to PROGRAM mode and transfer the program again.
				A295.12: Task error A task error has occurred. The following conditions will generate a task error. 1. There is no executable cyclic task. 2. There is no task that corresponds to the interrupt that was input. (Only when the *Stop CPU on Instruction Error* parameter in the PLC Setup is set to *Stop*.)	Check the startup cyclic task attributes. Check the execution status of each task as controlled by TKON(820) and TKOF(821).Make sure that all of the task numbers specified in TKON(820), TKOF(821), and MSKS(690) instructions have corresponding tasks. Use MSKS(690) to mask any I/O or scheduled interrupt tasks that are not being used and that do not have programs set for them.
				A295.10: Illegal access error An illegal access error has occurred and the PLC Setup has been set to stop operation for an instruction error. The following are illegal access errors: 1. Reading/writing a parameter area. 2. Writing memory that is not installed. 3. Writing an EM bank that is EM file memory. 4. Writing to a read-only area. 5. Indirect DM/EM address that is not in BCD when BCD mode is specified.	Find the program address where the error occurred (A298/A299) and correct the instruction.
				A295.09: Indirect DM/EM BCD error An indirect DM/EM BCD error has occurred and the PLC Setup has been set to stop operation for an instruction error.	Find the program address where the error occurred (A298/A299) and correct the indirect addressing or change to binary mode.
				A295.08: Instruction error An instruction processing error has occurred and the PLC Setup has been set to stop operation for an instruction error.	Find the program address where the error occurred (A298/A299) and correct the instruction.
				A295.14: Illegal instruction error The program contains an instruction that cannot be executed.	Retransfer the program to the CPU Unit.

Error	Error code (inA400)	Error flag (Auxiliary Area)	Flag and word data	Probable cause	Possible remedy
Memory Error	0x80F1	A401.15: Memory Error Flag	A403: Memory Error Location	An error has occurred in memory. A bit in A403 will turn ON to show the location of the error as listed below.	See below.
				A403.00 ON: A checksum error has occurred in the user program memory. The power was turned OFF while storing data to the flash memory (backup memory).	Check the program and correct the error.
				A403.04 ON: A checksum error has occurred in the PLC Setup.	Clear the entire PLC Setup to 0000 and reenter the settings.
				A403.05 ON: A checksum error has occurred in the registered I/O tables.	Initialize the registered I/O table and generate a new I/O table.
				A403.07 ON: A checksum error has occurred in the routing tables.	Initialize the routing tables and reenter the tables.
				A403.08 ON: A checksum error has occurred in the CPU Bus Unit Setup.	Initialize the CPU Bus Unit setup and reenter the settings.
				A403.10 ON: An error occurred in flash memory (backup memory).	CPU Unit hardware is faulty. Replace the CPU Unit.
Version Error	0x80F2	A401.05: Version Error Flag	A293	The user program that was transferred includes functions that are not supported by the unit version of the CPU Unit.	• Check whether the unit version supports the user program. • Upgrade the unit version of the CPU Unit.
Card Transfer Error	0x80F4	A401.03: Memory Card Error Flag	---	When A401.03 is ON: The contents of the Memory Card cannot be correctly read to the CPU Unit when the power is ON.	Check whether the files required for executing the automatic transfer function are available.
System Failure (FALS) Error	0xC101 to 0xC2FF	A401.06: FALS Error Flag	---	FALS(007) has been executed in the program. The error code in A400 will indicate the FAL number. The leftmost digit of the code will be C and the rightmost 3 digits of the code will be from100 to 2FF hex and will correspond to FAL numbers 001 to 511.	Correct according to cause indicated by the FAL number (set by user).

*1 Execute the I/O verification operation by selecting ntlp??? ***Options*** – ***Compare with Project*** from the I/O Table Menu of the CX-Programmer.

*2 A404.00 to A404.07 contain the error slot number (00 to 09) in binary. “0F hex” indicates that the slot cannot be determined.
“0B hex” indicates a bus error occurred for the built-in EtherNet/IP port.
“0E hex” indicates the End Cover is not connected to the CPU Rack or an Expansion Rack.

*3 The CJ1W-ID201 (8-point DC Input Unit), CJ1W-OC201 (8-point Contact Output Unit), CJ1W-IA201 (8-point AC Input Unit), CJ1W-OA201 (8-point Triac Output Unit), and CJ1W-OD201/202/203/204 (8-point Triac Output Units) are allocated one word each, so set them as 16-point Input Units or 16-point Output Units in the I/O tables when manually setting the I/O tables from the CX-Programmer. An I/O setting error will occur if they are set as 8-point Input Units or 8-point Output Units.

*4 Regardless of the error that occurred, the three bits in parentheses will be stored in A407.13 to A407.15. The value will simultaneously be stored in A407.00 to A407.12.

*5 Bits A410.00 to A410.15 correspond to unit numbers 0 to F.

*6 Bits A411.00 to A416.15 correspond to unit numbers 0 to 95.

A-3-2 Non-fatal Errors

Operation continues when a non-fatal error occurs. Connect the CX-Programmer to display the error message in the Error Log Dialog Box on the CX-Programmer.

The cause of the error can be determined from the error message and related Auxiliary Area flags and words. The following list shows the non-fatal errors.

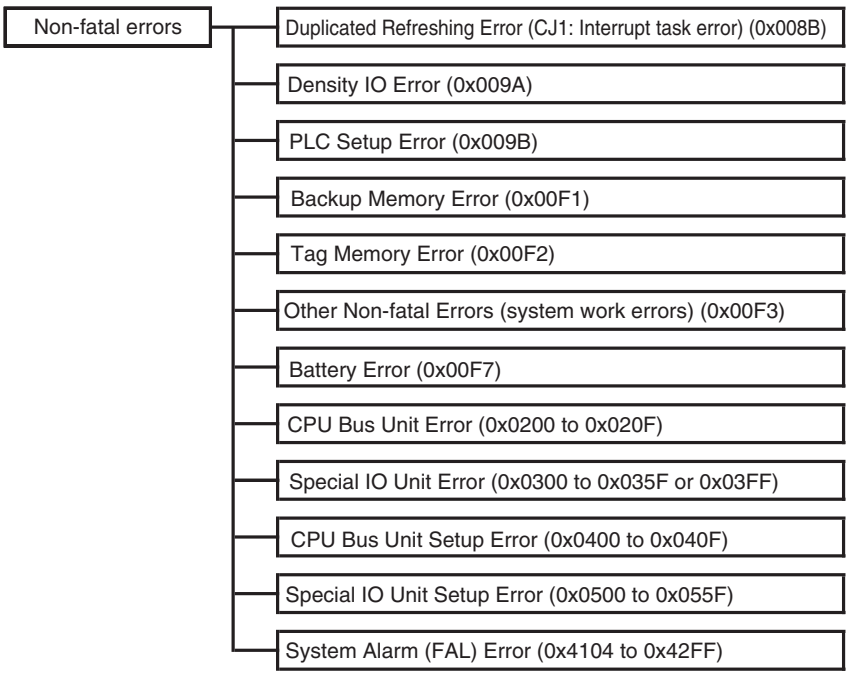

Non-fatal errors
Duplicated Refreshing Error (CJ1: Interrupt task error) (0x008B)
Density IO Error (0x009A)
PLC Setup Error (0x009B)
Backup Memory Error (0x00F1)
Tag Memory Error (0x00F2)
Other Non-fatal Errors (system work errors) (0x00F3)
Battery Error (0x00F7)
CPU Bus Unit Error (0x0200 to 0x020F)
Special IO Unit Error (0x0300 to 0x035F or 0x03FF)
CPU Bus Unit Setup Error (0x0400 to 0x040F)
Special IO Unit Setup Error (0x0500 to 0x055F)
System Alarm (FAL) Error (0x4104 to 0x42FF)

Table of Non-fatal Errors

- The table of non-fatal errors is arranged in ascending order of error codes.
- When two or more errors occur at the same time, the error code of the more serious error will be recorded in A400.
- When the IOM Hold Bit is set to ON, I/O memory will be retained and outputs to the Output Unit will turn OFF.

Error	Error code (in A400)	Error flag (Auxiliary Area)	Flag and word data	Probable cause	Possible remedy
Duplicated Refreshing Error (CJ1: Interrupt task error)	0x008B	A402.13: Duplicated Refresh Error Flag	A426: Unit number where duplicated refresh error occurred	ON when the Detect Duplicated Refresh Errors setting in the PLC Setup is set to *Detect* and one of the following occurs for the same Special I/O Unit. • IORF(097), FIORF(225), IORD(222) or IOWR(223) in a cyclic task are competing with FIORF(225), IORF(097), IORD(222) or IOWR(223) in an interrupt task. • IORF(097), FIORF(225), IORD(222) or IOWR(223) was executed in an interrupt task when I/O was being refreshed.*1	Check the program. Either disable detection of duplicated refresh errors in the PLC Setup or correct the problem in the program.
Density IO Error	0x009A	A402.12: CJ-series Basic I/O Unit Error Flag	A408: Basic I/O Unit Error, Slot Number	An error has occurred in a Basic I/O Unit.*2	Check the Basic I/O Unit to see whether a fuse needs to be replaced.
PLC Setup Error	0x009B	A402.10: PLC Setup Error Flag	---	There is a setting error in the PLC Setup. The location of the error is written to A406.	Change the indicated setting to a valid setting.
Backup Memory Error	0x00F1	A315.15: Backup Memory Error Flag	---	Writing to the built-in flash memory failed.	Operation may not be possible the next time power is restored after a power interruption. Replace the CPU Unit.
Tag Memory Error	0x00F2	A315.12: Tag Memory Error Flag	---	An error occurred in memory where network tags are stored.	Operation may not be possible the next time power is restored after a power interruption. Replace the CPU Unit.
Other Non-fatal Error (system work error)	0x00F3	A402.00: Other Non-fatal Error (System Work Error) Flag	---	A non-fatal error other than the non-fatal errors allocated in A402.01 to A402.15 occurred (such as an online editing memory error). The details are stored in A315.	Operation may not be possible the next time power is restored after a power interruption. Replace the CPU Unit.
Battery Error	0x00F7	A402.04: Battery Error Flag	---	This error occurs when the PLC Setup has been set to detect battery errors and the CPU Unit's backup battery is missing or its voltage has dropped.	Check battery and replace if necessary. Change the PLC Setup setting if battery-free operation is being used.
CPU Bus Unit Error	0x0200 to 0x020F	A402.07: CPU Bus Unit Error Flag	A417: CPU Bus Unit Error, Unit Number Flags	An error occurred in a data exchange between the CPU Unit and a CPU Bus Unit.*3	Check the Unit indicated in A417. Refer to the Unit's operation manual to find and correct the cause of the error. Restart the Unit by toggling its Restart Bit or turn the power OFF and ON again. Replace the Unit if it won't restart.
Special IO Unit Error	0x0300 to 0x035F or 0x03FF	A402.06: Special I/O Unit Error Flag	A418 to A423: Special I/O Unit Error, Unit Number Flags	An error occurred in a data exchange between the CPU Unit and a Special I/O Unit.*4	Check the Unit indicated in A418 to A423. Refer to the Unit's operation manual to find and correct the cause of the error. Restart the Unit by toggling its Restart Bit or turn the power OFF and ON again. Replace the Unit if it won't restart.
CPU Bus Unit Setup Error	0x0400 to 0x040F	A402.03: CPU Bus Unit Setting Error Flag	A427: CPU Bus Unit Setting Error, Unit Number Flags	An installed CPU Bus Unit does not match the CPU Bus Unit registered in the I/O tables.*5	Change the registered I/O table.
Special IO Unit Setup Error	0x0500 to 0x055F	A402.02: Special I/O Unit Setting Error Flag	A428 to A433: Special I/O Unit Setting Error, Unit Number Flags	An installed Special I/O Unit does not match the Special I/O Unit registered in the I/O tables.*6	

Error	Error code (in A400)	Error flag (Auxiliary Area)	Flag and word data	Probable cause	Possible remedy
System Alarm (FAL) Error	0x4101 to 0x42FF	A402.15: FAL Error Flag	A360 to A391: Executed FAL Number Flags	FAL(006) has been executed in program.*7	Correct according to cause indicated by FAL number (set by user).

*1 If cyclic refreshing is not disabled in the PLC Setup for a Special I/O Unit and IORF(097), FIORF(225), IORD(222) or IOWR(223) is executed for the same Special I/O Unit in an interrupt task, a duplicate refreshing status will occur and an duplicated refreshing error will occur.

*2 A408 contains the errant rack/slot number.

*3 The corresponding flag in A417 is turned ON to indicate the problem Unit.

*4 The corresponding flag in A418 to A423 is turned ON to indicate the problem Unit.

*5 The corresponding flag in A427 will be ON.

*6 The corresponding flag in A428 to A433 will be ON.

*7 Executed FAL Number Flags in consecutive bits in A360 to A391 correspond to FAL numbers 001 to 511.
The error code in A400 will indicate the FAL number.
The leftmost digit of the code will be 4 and the rightmost 3 digits of the code will be from 101 to 2FF hex and will correspond to FAL numbers 001 to 511.

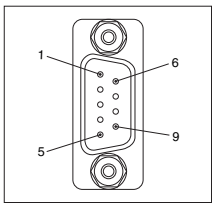
A-4 Connecting to the RS-232C Serial Port on the CPU Unit

This appendix provides connection diagrams and wiring methods for making an RS-232C cable to connect to the serial port on the CPU Unit.

A-4-1 RS-232C Port Specifications

Connector Pin Arrangement

Pin No.	Signal	Name	Direction
1	FG	Protection earth	---
2	SD (TXD)	Send data	Output
3	RD (RXD)	Receive data	Input
4	RS (RTS)	Request to send	Output
5	CS (CTS)	Clear to send	Input
6	5 V	Power supply	---
7	DR (DSR)	Data set ready	Input
8	ER (DTR)	Data terminal ready	Output
9	SG (0 V)	Signal ground	---
Connector hood	FG	Protection earth	---



Precautions for Correct Use

Do not use the 5-V power from pin 6 of the RS-232C port on the CPU Unit for anything but the NT-AL001-E Link Adapter. The external device or the CPU Unit may be damaged.

Communications Specifications

Item	Specification
Communications method	Half duplex
Synchronization	Start-stop
Baud rate	0.3/0.6/1.2/2.4/4.8/9.6/19.2/38.4/57.6/115.2 kbps*1
Transmission distance	15 m max.
Interface	EIA RS-232C
Protocol	Host Link, NT Link, 1:N, No-protocol, or Peripheral Bus

*1 Baud rates for the RS-232C are specified only up to 19.2 kbps. The CJ Series supports serial communications from 38.4 kbps to 115.2 kbps, but some computers cannot support these speeds. Lower the baud rate if necessary.

A-4-2 Connection Examples

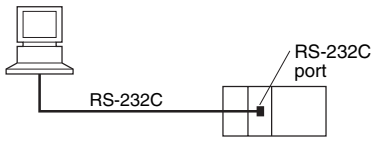
This section provides connection examples and corresponding connection diagrams.

Refer to *A-4-3 Applicable Connectors and Recommended Cables* for actual wiring methods.

Connections to Host Computers

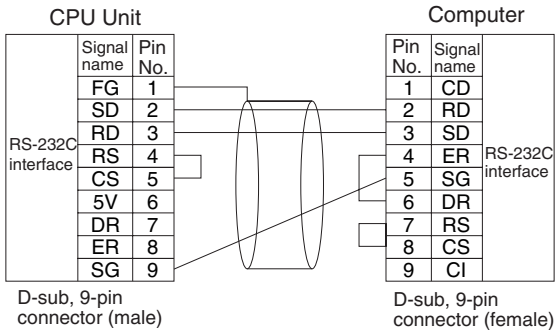
Note Connections to a computer running the CX-Programmer are the same as those shown here.

● 1:1 Connections via RS-232C Port

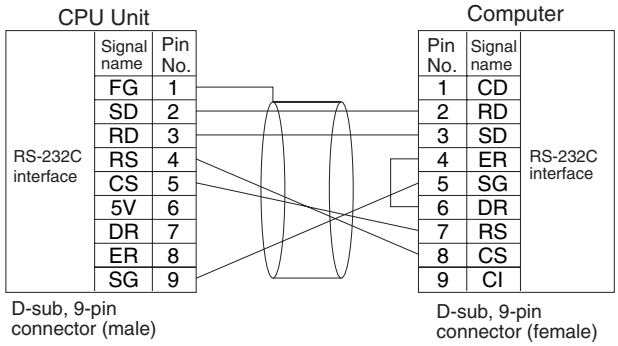


Note The maximum cable length for an RS-232C connection is 15 m. RS-232C communications specifications, however, do not cover transmissions at 19.2 Kbps. Refer to documentation of the device being connected when using this baud rate.

Connection Example for the Host Link Serial Communications Mode

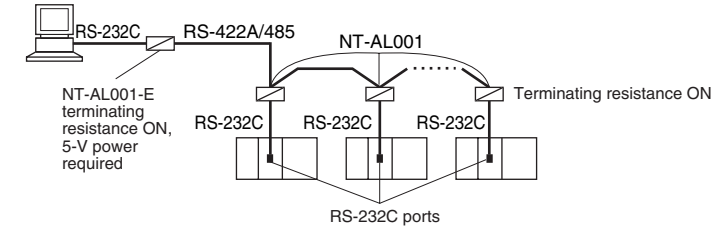


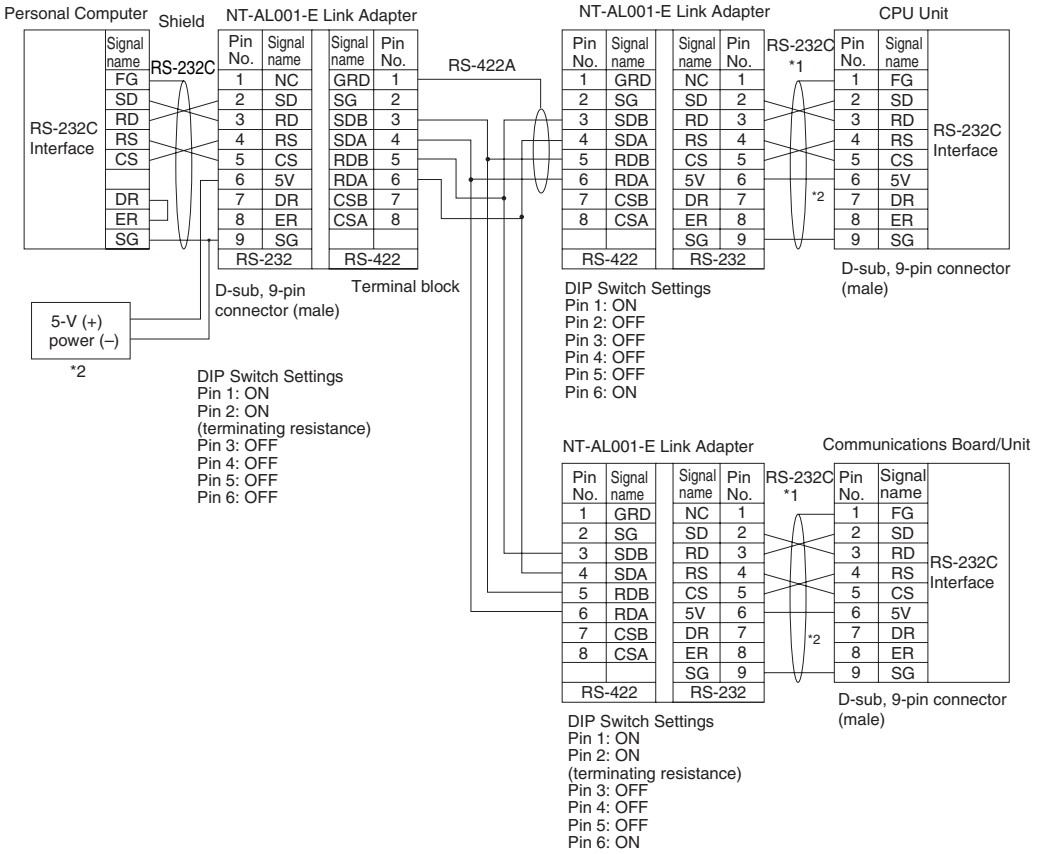
Connection Example for the Peripheral Bus (Toolbus) Serial Communications Mode



● 1:N Connections via RS-232C Port

A connection example for converting between RS-232C and RS-422A/485 to use 1:N connections is shown below.



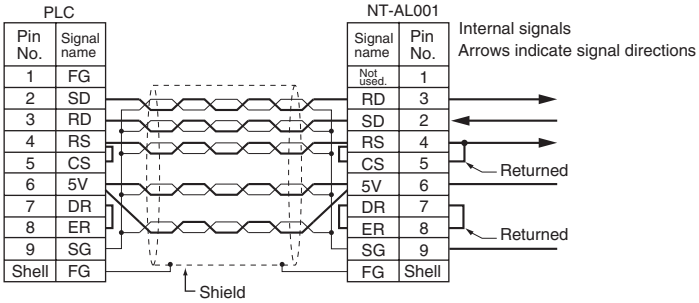


*1 We recommend using the following NT-AL001-E Link Adapter Connecting Cables to connect to NT-AL001-E Link Adapters.

XW2Z-070T-1: 0.7 m
XW2Z-200T-1: 2 m

- Wiring the Recommended Cable (XW2Z-070/200T-1)
  The recommended cables should be wired as shown below. For an RS-232C cable, each signal wire should be twisted with the SG (signal ground) wire and placed in a shielded cable to prevent the effects of noise in noise-prone environments. The 5-V wires can also be twisted with the SG wire to increase noise immunity. Although this wiring is different from that shown in the example above, it can be used to increase noise immunity if required.

Wiring with XW2Z-□□0T-1 (10 conductors)



*2 When the NT-AL001-E Link Adapter is connected to the RS-232C port on the CPU Unit, 5 V is supplied from pin 6, eliminating the need for a 5-V power supply.

Precautions for Correct Use

- Do not use the 5-V power from pin 6 of the RS-232C port for anything but the NT-AL001-E Link Adapter. Using this power supply for any other external device may damage the CPU Unit or the external device.
- The XW1Z-□□0T-1 Cable is designed to connect the NT-AL001-E and contains special wiring for the CS and RS signals. Do not use this cable for any other application. Connecting this cable to other devices can damage them.

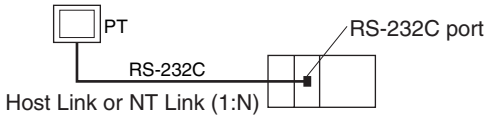
DIP Switch Settings on the NT-AL001-E Link Adapter

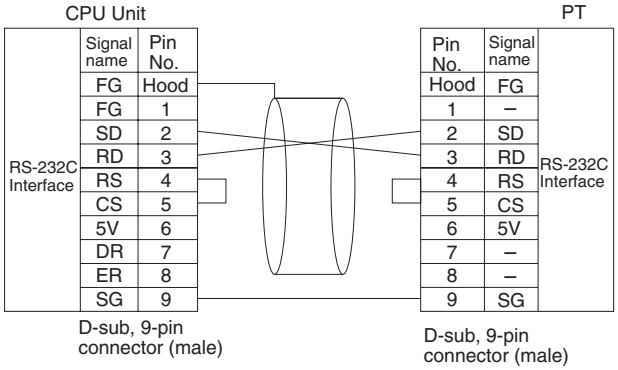
There is a DIP switch on the NT-AL001-E Link Adapter that is used to set RS-422A/485 communications parameters. Set the DIP switch as required for the serial communications mode according to the following table.

Pin	Function	Default setting
1	Not used. (Leave set to ON.)	ON
2	Internal terminating resistance setting. ON: Terminating resistance connected. OFF: Terminating resistance not connected.	ON
3	2-wire/4-wire setting	OFF
4	Both pins ON: 2-wire communications Both pins OFF: 4-wire communications	OFF
5	Communications mode	ON
6	Both pins OFF: Always send. 5 OFF/6 ON: Send when RS-232C's CS is high. 5 ON/6 OFF: Send when RS-232C's CS is low.	OFF

Connection Example to Programmable Terminal (PT)

● Direct Connection from RS-232C to RS-232C

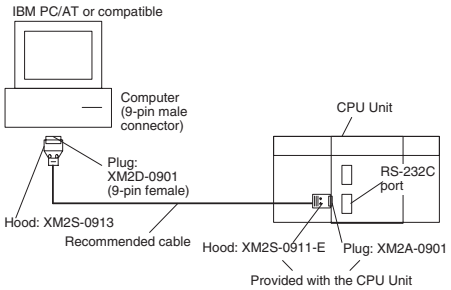




- Communications Mode: Host Link (unit number 0 only for Host Link)
  NT Link (1:N, N = 1 Unit only)
- OMRON Cables with Connectors:
  XW2Z-200T-1: 2 m
  XW2Z-500T-1: 5 m

A-4-3 Applicable Connectors and Recommended Cables

Use the following connectors and cables when making an RS-232C cable to connect to the RS-232C port.



● Applicable Connectors

CPU Unit Connector

Item	Model	Specifications	
Plug	XM2A-0901	9-pin male	Used together (One of each provided with CPU Unit.)
Hood	XM2S-0911-E	9-pin, millimeter screws, static-resistant	

Personal Computer Connector for IBM PC/AT Computer (9-pin Male Connector)

Item	Model	Specifications	
Plug	XM2A-0901	9-pin female	Used together
Hood	XM2S-0913	9-pin, inch screws, static-resistant	

● Recommended Cables

We recommend using the following shielded twisted-pair cables to provide noise resistance.

Fujikura Ltd.:UL2464 AWG28 × 5P IFS-RVV-SB (UL product)
AWG 28 × 5P IFVV-SB (non-UL product)

Hitachi Cable, Ltd.:UL2464-SB(MA) 5P × 28AWG (7/0.127) (UL product)
CO-MA-VV-SB 5P × 28AWG (7/0.127) (non-UL product)

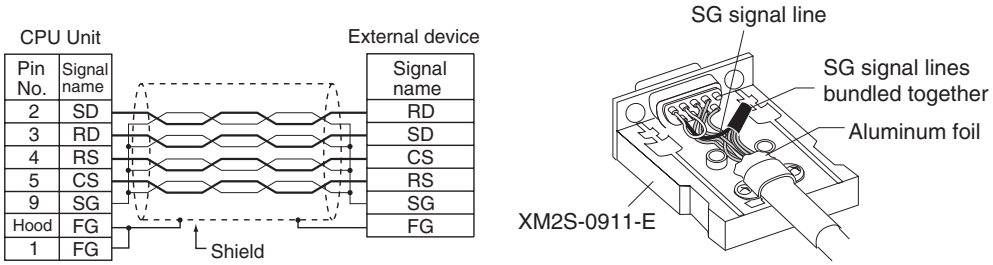
Precautions for Correct Use

Use the special cables provided from OMRON for all connections whenever possible. If cables are produced in-house, be sure they are wired correctly. External devices and the CPU Unit may be damaged if general purpose (e.g., computer to modem) cables are used or if wiring is not correct.

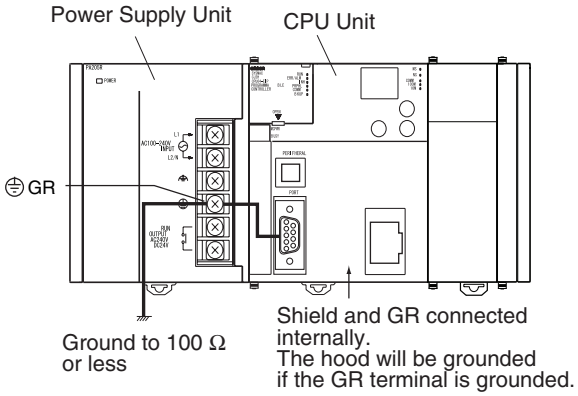
A-4-4 Example of Recommended RS-232C Wiring

We recommend the following wiring methods for RS-232C, especially in environment prone to noise.

- Use shielded twisted-pair cable for communications cables.
- Use a twisted-pair cable for each signal line and SG (signal ground) to connect the CPU Unit to a communications partner. Also, bundle all the SG lines at the Unit and at the other device and connect them together.
- Connect the shield line of the communications cable to the hood (FG) of the RS-232C connector at the Unit. Also, ground the protective earth (GR) terminal of the Power Supply Units on the CPU Rack and the CJ-series Expansion Racks to a resistance of 100 Ω or less. The following example shows connecting SD-SG, RD-SG, RS-SG, and CS-SG for Serial Communications Mode using a twisted-pair cable using the peripheral bus.



Note The hood (FG) is internally connected to the protective earth (GR) terminal on the Power Supply Unit through the CPU Rack. FG can thus be connected by connecting the protective earth (GR) terminal on the Power Supply Unit. The hood (FG) is also electrically connected to pin 1 (FG), but the connection resistance between the shield and the FG is smaller for the hood. To reduce contact resistance between the hood (FG) and the FG, connect the shield both to the hood (FG) and to pin 1 (FG).


Power Supply Unit
CPU Unit
GR
Ground to 100 Ω or less
Shield and GR connected internally.
The hood will be grounded if the GR terminal is grounded.

A-4-5 Wiring Connectors

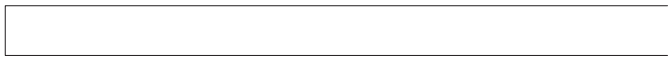
Use the following procedures to wire connectors.

Preparing the Cable

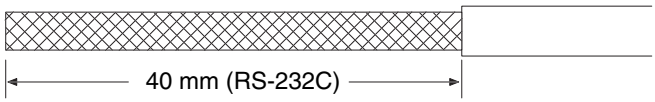
Lengths for steps in the procedure are provided in the diagrams.

● Connecting the Shield Line to the Hood (FG)

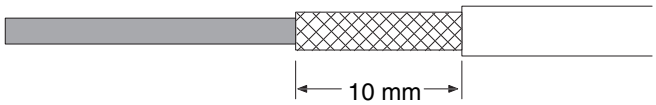
1. Cut the cable to the required length, leaving leeway for wiring and laying the cables.



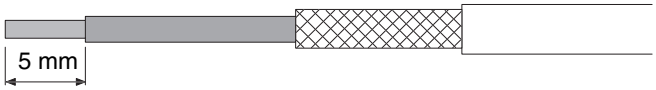
2. Use a razor blade to cut away the sheath, being careful not to damage the braiding.



3. Use scissors to cut away all but 10 mm of the exposed braiding.



4. Use wire strippers to remove the insulation from the end of each wire.



5. Fold the braiding back over the end of the sheath.



6. Wrap aluminum foil tape over the top of the braiding for one and a half turns.

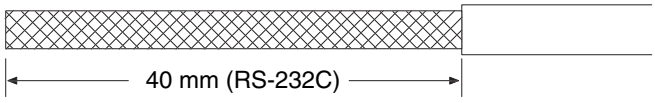


● Not Connecting the Shield to the Hood (FG)

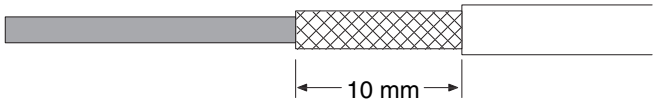
1. Cut the cable to the required length, leaving leeway for wiring and laying the cables.



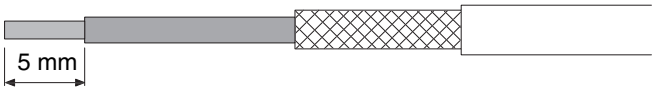
2. Use a razor blade to cut away the sheath, being careful not to damage the braiding.



3. Use scissors to cut away the exposed braiding.



4. Use wire strippers to remove the insulation from the end of each wire.



5. Wrap electrician's tape over the top and end of the cut sheath.

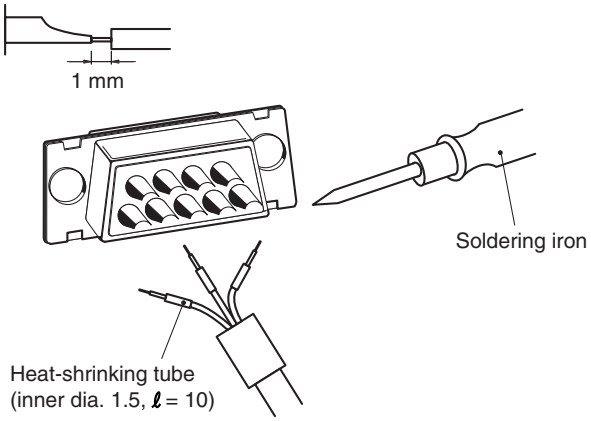


● Soldering

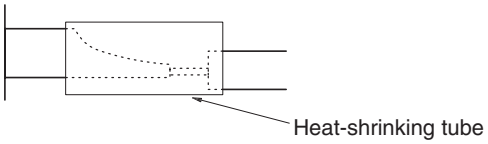
1. Place heat-shrinking tubes over all wires.

2. Pre-solder all wires and connector terminals.

3. Solder the wires.

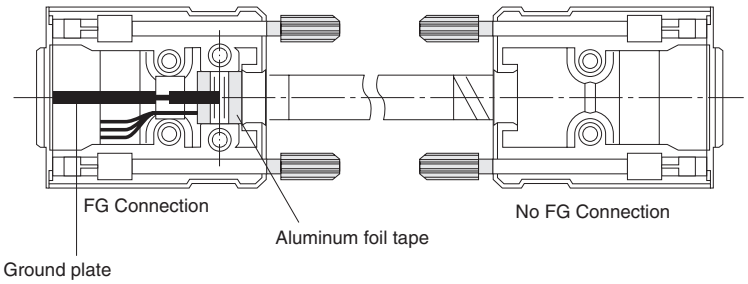


4. Move the heat-shrinking tubes onto the soldered area and shrink them into place.



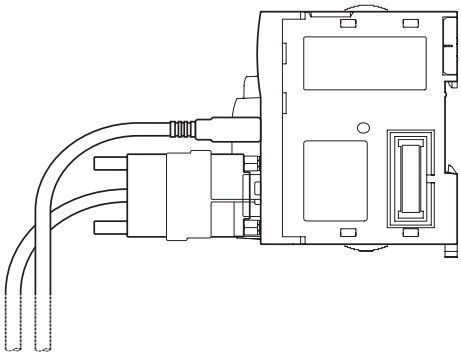
● Assembling the Hood

Assemble the connector hood as shown.



Connections to the CPU Unit

- Always turn OFF the power supply to the PLC before connecting or disconnecting communications cables.
- Tighten the communications connector attachment screws to 0.4 N·m.



A-5 Installing the USB Driver

The USB driver must be installed in the computer to connect the PLC to the computer using the USB port.

Procedure for Installing the USB Driver

This section describes the procedure for connecting a computer to the peripheral (USB) port on the CJ2 CPU Unit for the first time. This example assumes that the Support Software is already installed.

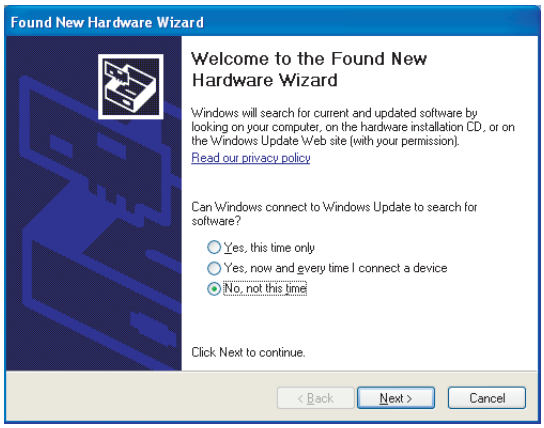
● Windows XP

1. Turn ON the power supply to the CJ2 PLC, and connect a USB cable between the USB port on the computer and the peripheral (USB) port on the CJ2 CPU Unit.

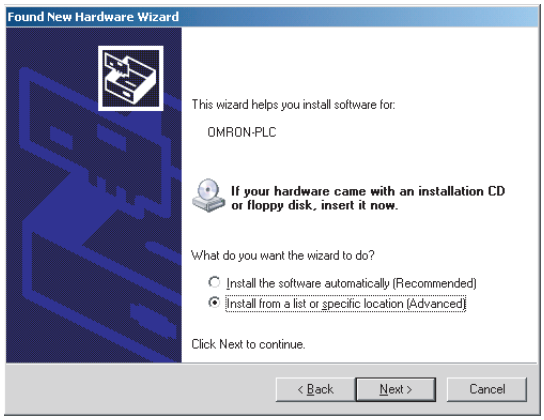
   After the cable has been connected, the computer will automatically recognize the device and the following message will be displayed.



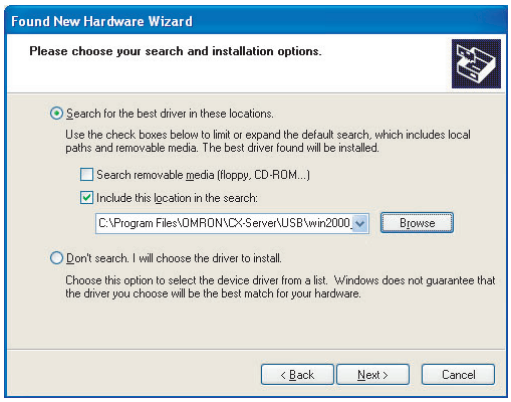
2. If the following window appears, select the *No, not this time* Option and then click the **Next** Button. This window is not always displayed.


Found New Hardware Wizard
Welcome to the Found New Hardware Wizard
Windows will search for current and updated software by looking on your computer, on the hardware installation CD, or on the Windows Update Web site (with your permission).
Read our privacy policy
Can Windows connect to Windows Update to search for software?
Yes, this time only
Yes, now and every time I connect a device
No, not this time
Click Next to continue.
< Back
Next >
Cancel

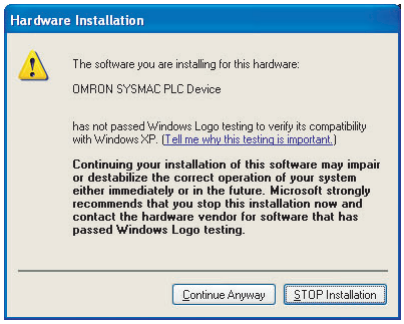
3. The following window will be displayed. Select the *Install from a list of specific location* Option and then click the **Next** Button.


Found New Hardware Wizard
This wizard helps you install software for:
OMRON-PLC
If your hardware came with an installation CD or floppy disk, insert it now.
What do you want the wizard to do?
Install the software automatically (Recommended)
Install from a list or specific location (Advanced)
Click Next to continue.
< Back
Next >
Cancel

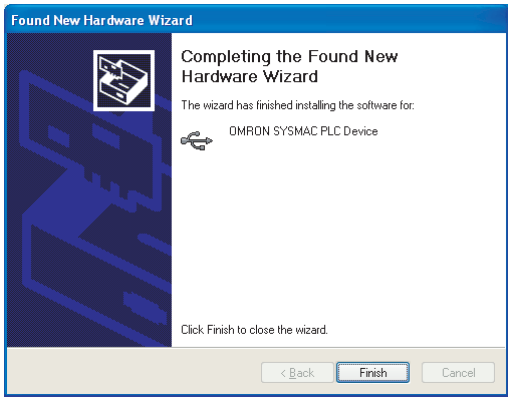
4. The following window will be displayed. Click the **Browse** Button for the *Include this location in the search* Field, specify C:\Program Files\OMRON\CX-Server\USB\win2000_XP\Inf, and then click the **Next** Button. The driver will be installed. ("C:\" indicates the installation drive and may be different on your computer.)


Found New Hardware Wizard
Please choose your search and installation options.
Search for the best driver in these locations.
Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed.
Search removable media (floppy, CD-ROM...)
Include this location in the search:
C:\Program Files\OMRON\CX-Server\USB\win2000_
Browse
Don't search. I will choose the driver to install.
Choose this option to select the device driver from a list. Windows does not guarantee that the driver you choose will be the best match for your hardware.
< Back
Next >
Cancel

5. Ignore the following window if it is displayed and click the **Continue Anyway** Button.


Hardware Installation
The software you are installing for this hardware:
OMRON SYSMAC PLC Device
has not passed Windows Logo testing to verify its compatibility with Windows XP. (Tell me why this testing is important.)
Continuing your installation of this software may impair or destabilize the correct operation of your system either immediately or in the future. Microsoft strongly recommends that you stop this installation now and contact the hardware vendor for software that has passed Windows Logo testing.
Continue Anyway
STOP Installation

6. The following window will be displayed if the installation is completed normally. Click the **Finish** Button.


Found New Hardware Wizard
Completing the Found New Hardware Wizard
The wizard has finished installing the software for:
OMRON SYSMAC PLC Device
Click Finish to close the wizard.
< Back
Finish
Cancel

● Windows 2000

1. Turn ON the power supply to the CJ2 PLC, and connect a USB cable between the USB port on the computer and the peripheral (USB) port on the CJ2 CPU Unit.

   After the cable has been connected, the computer will automatically recognize the device and the following message will be displayed.

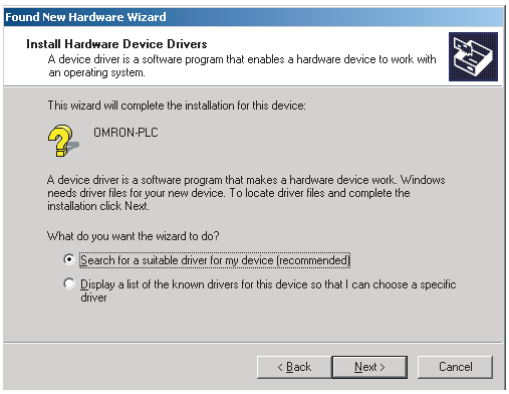


2. The following message will be displayed. Click the **Next** Button.

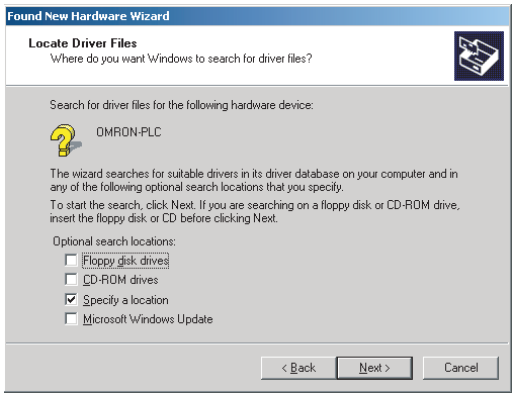

Found New Hardware Wizard
Welcome to the Found New Hardware Wizard
This wizard helps you install a device driver for a hardware device.
To continue, click Next.
< Back
Next >
Cancel

3. The following window will be displayed.

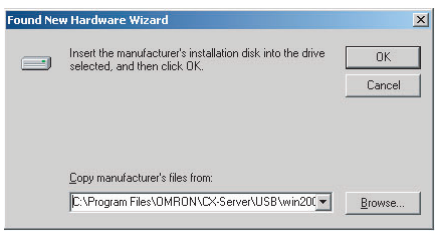
Select the *Search for a suitable driver for the device (recommended)* Option and then click the **Next** Button.


Found New Hardware Wizard
Install Hardware Device Drivers
A device driver is a software program that enables a hardware device to work with an operating system.
This wizard will complete the installation for this device:
OMRON-PLC
A device driver is a software program that makes a hardware device work. Windows needs driver files for your new device. To locate driver files and complete the installation click Next.
What do you want the wizard to do?
Search for a suitable driver for my device (recommended)
Display a list of the known drivers for this device so that I can choose a specific driver
< Back
Next >
Cancel

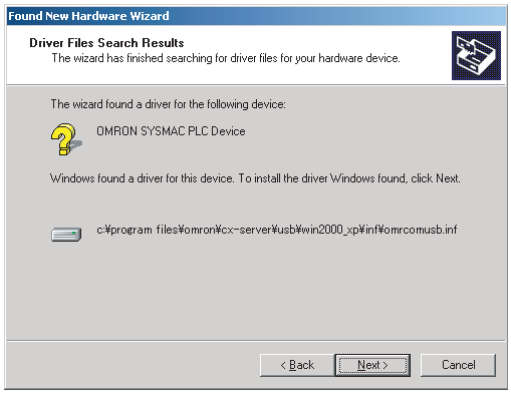
4. The following window will be displayed. From the list in the window, select the *Specify location* Check Box and then click the **Next** Button.


Found New Hardware Wizard
Locate Driver Files
Where do you want Windows to search for driver files?
Search for driver files for the following hardware device:
OMRON-PLC
The wizard searches for suitable drivers in its driver database on your computer and in any of the following optional search locations that you specify.
To start the search, click Next. If you are searching on a floppy disk or CD-ROM drive, insert the floppy disk or CD before clicking Next.
Optional search locations:
Floppy disk drives
CD-ROM drives
Specify a location
Microsoft Windows Update
< Back
Next >
Cancel

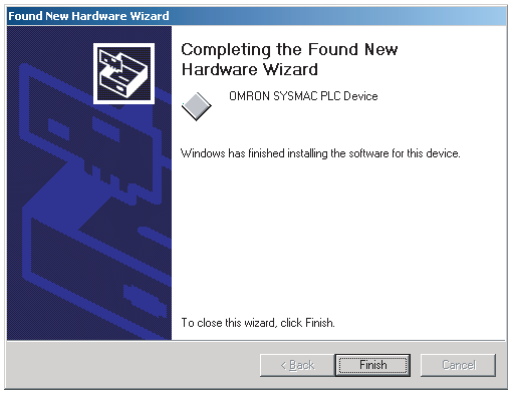
5. Click the **Browse** Button, specify C:\Program Files\OMRON\CX-Server\USB\win2000_XP\Inf, and then click the **Next** Button. (“C:\” indicates the installation drive and may be different on your computer.)



6. A search will be made for the driver and the following window will be displayed. Click the **Next** Button. The driver will be installed.


Found New Hardware Wizard
Driver Files Search Results
The wizard has finished searching for driver files for your hardware device.
The wizard found a driver for the following device:
OMRON SYSMAC PLC Device
Windows found a driver for this device. To install the driver Windows found, click Next.
c:¥program files¥omron¥cx-server¥usb¥win2000_xp¥inf¥omrcomusb.inf
< Back
Next >
Cancel

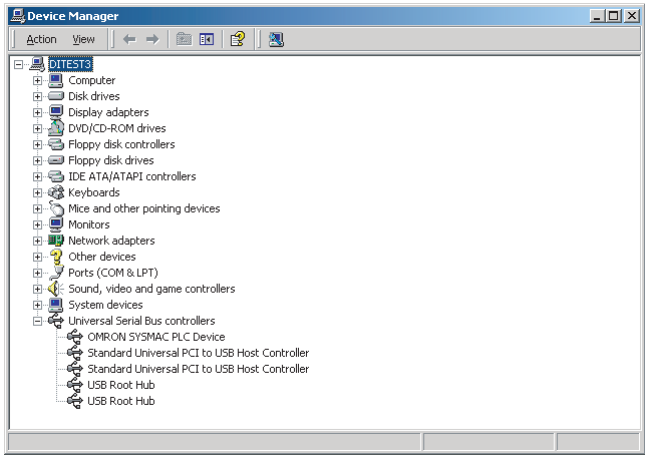
7. After the driver has been successfully installed, the following window will be displayed. Click the **Finish** Button.


Found New Hardware Wizard
Completing the Found New Hardware Wizard
OMRON SYSMAC PLC Device
Windows has finished installing the software for this device.
To close this wizard, click Finish.
< Back
Finish
Cancel

Checking after Installation

1. Display the Device Manager at the computer.

2. Click *USB (Universal Serial Bus) Controller*, and confirm that *OMRON SYSMAC PLC Device* is displayed.

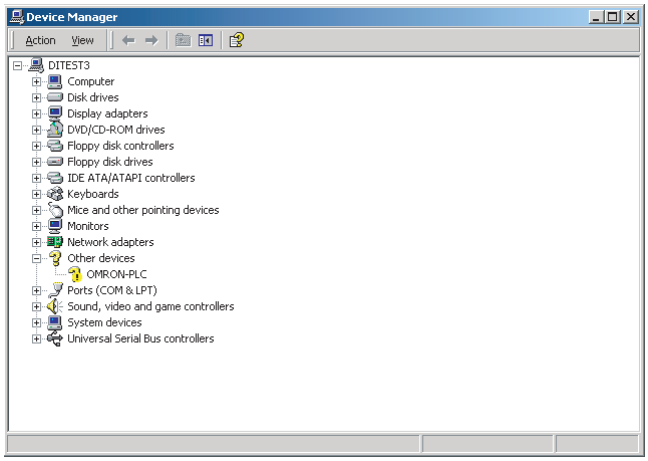


Re-installing the USB Driver

If the USB driver installation fails for some reason or is cancelled in progress, the USB driver must be reinstalled.

● Checking USB Driver Status

1. Display the Device Manager on the computer.
2. If *USB Device* is displayed for *Other devices*, it means that the USB driver installation has failed.



● Reinstalling the USB Driver

1. Right-click *USB Device* and select ***Delete*** from the pop-up menu to delete the driver.
2. Reconnect the USB cable. The USB Driver Installation Window will be displayed.
3. Reinstall the USB driver.

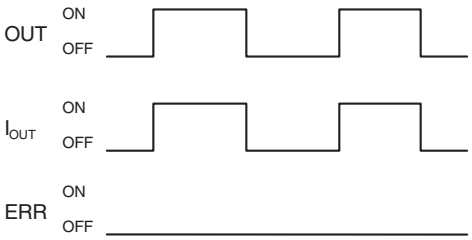
A-6 Load Short-circuit Protection and Line Disconnection Detection for Basic I/O Units

A-6-1 Load Short-circuit Protection and Line Disconnection Detection for CJ1W-OD202

This section describes the load short-circuit protection of the CJ1W-OD202 Output Units.

As shown below, normally when the output bit turns ON (OUT), the transistor will turn ON and then output current (Iout) will flow.

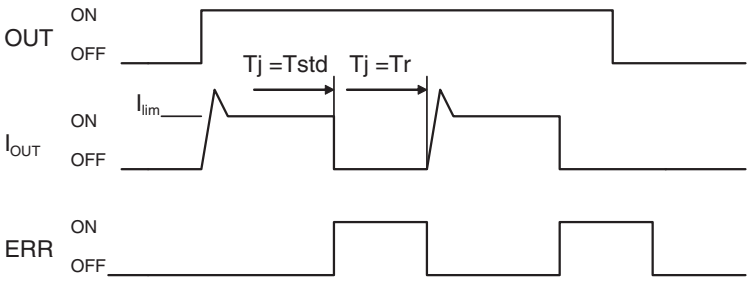
Normal Operation



OUT:	OUTPUT instruction
I_{OUT}:	Output current
ERR:	Alarm output, ERR indicator
I_{lim}:	Short-circuit detection current
I_{OL}:	Disconnection detection current
T_j:	Junction temperature of transistor
T_{std}:	Thermal shutdown temperature
T_r:	Reset temperature

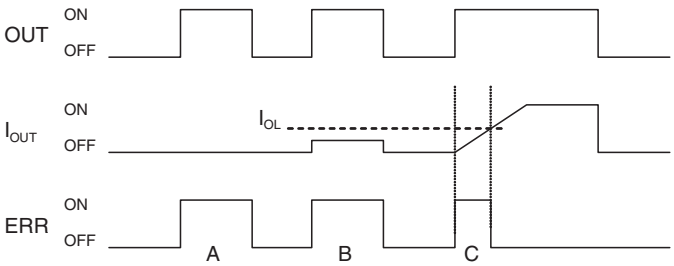
If the output (Iout) is overloaded or short-circuited exceeding the detection current (Ilim), the output current (Iout) will be limited as shown in figure below. When the junction temperature (Tj) of the output transistor reaches the thermal shutdown temperature (Tstd), the output will turn OFF to protect the transistor from being damaged, and the alarm output bit will turn ON to light the ERR indicator. When the junction temperature (Tj) of the transistor drops down to the reset temperature (Tr), the ERR indicator will be automatically reset and the output current will start flowing.

Operation for Overload or Short Circuit



If the line is disconnected and the output current (Iout) drops below the line disconnection detection current (IOL), the ERR indicator will light as shown in the following figure.

Operation for Disconnected Line with Output Current below the Line Disconnection Detection Current



A: Load not connected or load line broken.

B: Current to load at or below line disconnection detection current.

C: Rise of current to load too slow and error detected before the disconnection detection current was reached.

When load L is connected, the ERR indicator may light and the Alarm Output Bit may turn ON for approximately 100 ms. The programming example given later in this section can be used so that an error is not detected in this case.

● Operating Restrictions

Although the CJ1W-OD202 is provided with short-circuit protection, these are for protecting internal circuits against momentary short-circuiting in the load. As shown in Figure 2, the short-circuit protection is automatically released when the Tj equals to Tr. Therefore, unless the cause of short-circuit is removed, ON/OFF operations will be repeated in the output. Leaving short-circuits for any length of time will cause internal temperature rise, deterioration of elements, discoloration of the case or PCBs, etc. Therefore, observe the following restrictions.

● Restrictions

If a short-circuit occurs in an external load, immediately turn OFF the corresponding output and remove the cause. The CJ1W-OD202 turns ON an alarm output bit that corresponds to the external load output number. There is an alarm output bit for every common.

When an alarm output bit turns ON, use a self-holding bit for the alarm in the user program and turn OFF the corresponding output.

The alarm output bit is allocated in the Basic I/O Unit Information Area (A050 to A069) for every Unit mounting slot.

The following table shows the correspondence between output bits and bits in the Basic I/O Unit Information Area.

Output bit		0 to 1	2 to 3	4 to 5	6 to 7
CJ1W-OD202	Mounted in even slot	0	1	2	3
	Mounted in odd slot	8	9	10	11

For example, when the CJ1W-OD202 is mounted in slot 0 on Rack 0, A50.00 will turn ON if the output 0 is short-circuited. When the CJ1W-OD202 is mounted in slot 1 of Rack 0, A50.11 will turn ON if the output 7 is short-circuited.

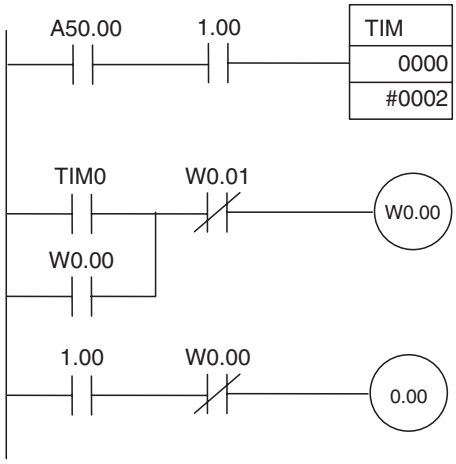
● Programming Example

In this example, CJ1W-OD202 is mounted in slot 0 of the Rack 0.

This example shows how to turn OFF output bits CIO 0.00 immediately if the alarm output bit A50.00 turns ON and how to keep the output bits OFF until the cause is removed and the bit is reset using work bit W0.01.

Change to CIO 0.00, CIO 1.00, 0 (under TIM and at bottom right of diagram), A50.00, and W0.01.

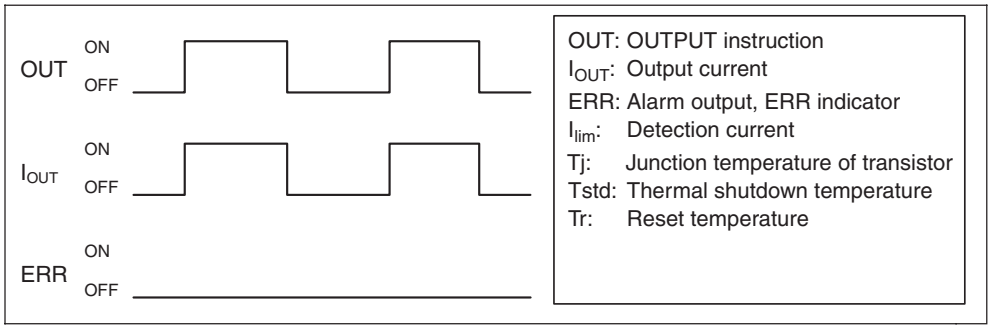
To prevent the alarm output bit from turning ON momentarily when the load turns ON, the alarm output is not turned ON for 200 ms after the input (CIO 1.00) turns ON.



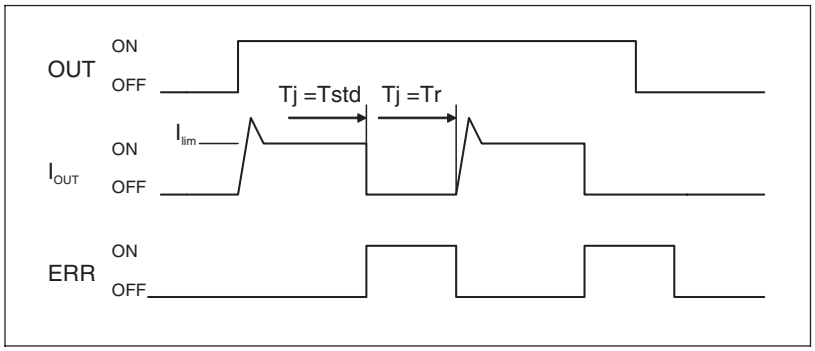
A-6-2 Load Short-circuit Protection for CJ1W-OD204/OD212/OD232/MD232

As shown below, normally when the output bit turns ON (OUT), the transistor will turn ON and then output current (Iout) will flow. If the output (Iout) is overloaded or short-circuited exceeding the detection current (Ilim), the output current (Iout) will be limited as shown in second figure below. When the junction temperature (Tj) of the output transistor reaches the thermal shutdown temperature (Tstd), the output will turn OFF to protect the transistor from being damaged, and the alarm output bit will turn ON to light the ERR indicator. When the junction temperature (Tj) of the transistor drops down to the reset temperature (Tr), the ERR indicator will be automatically reset and the output current will start flowing.

Normal Operation



Operation for Overload or Short Circuit



Operating Restrictions for the CJ1W-OD204/OD212/OD232/MD232

These Units are provided with short-circuit protection, these are for protecting internal circuits against momentary short-circuiting in the load. As shown in Figure 2, the short-circuit protection is automatically released when the Tj equals to Tr. Therefore, unless the cause of short-circuit is removed, ON/OFF operations will be repeated in the output. Leaving short-circuits for any length of time will cause internal temperature rise, deterioration of elements, discoloration of the case or PCBs, etc. Therefore, observe the following restrictions.

Restrictions

If a short-circuit occurs in an external load, immediately turn OFF the corresponding output and remove the cause. An alarm output bit that corresponds to the external load output number is turned ON. There is an alarm output bit for every common.

When an alarm output bit turns ON, use a self-holding bit for the alarm in the user program and turn OFF the corresponding output.

The alarm output bit is allocated in the Basic I/O Unit Information Area (A050 to A069) for every Unit mounting slot.

The following table shows the correspondence between output bits and bits in the Basic I/O Unit Information Area.

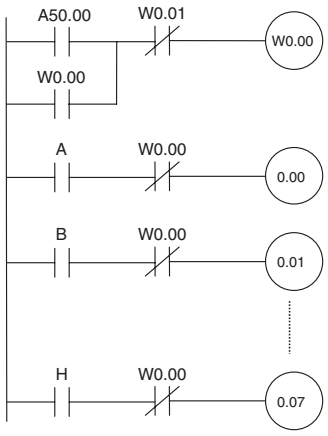
Output bit		m		m+1	m+2	m+3
		0 to 7	8 to 15	0 to 15	0 to 15	0 to 15
CJ1W-OD204	Mounted in even slot	0				
	Mounted in odd slot	8				
CJ1W-OD212	Mounted in even slot	0				
	Mounted in odd slot	8				
CJ1W-MD232	Mounted in even slot	0				
	Mounted in odd slot	8				
CJ1W-OD232	Mounted in even slot	0		1		
	Mounted in odd slot	8		9		

For example, when the CJ1W-OD212 is mounted in slot 0 on Rack 0, A50.00 will turn ON if the output 8 is short-circuited. When the CJ1W-OD232 is mounted in slot 1 of Rack 0, A50.09 will turn ON if the output m+1 is short-circuited.

Programming Example

In this example, CJ1W-OD212 is mounted in slot 0 of the Rack 0.

This example shows how to turn OFF output bits CIO 0.00 to CIO 0.07 immediately if the alarm output bit A50.00 turns ON and how to keep the output bits OFF until the cause is removed and the bit is reset using work bit W0.01.



A-7 Relay Output Noise Reduction Methods

The CJ-series PLCs conforms to the Common Emission Standards (EN61000-6-4) of the EMC Directives. However, noise generated by relay output switching may not satisfy these Standards. In such a case, a noise filter must be connected to the load side or other appropriate countermeasures must be provided external to the PLC.

Countermeasures taken to satisfy the standards vary depending on the devices on the load side, wiring, configuration of machines, etc. Following are examples of countermeasures for reducing the generated noise.

Countermeasures

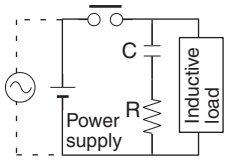
(Refer to EN61000-6-4 for more details.)

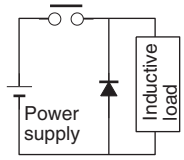
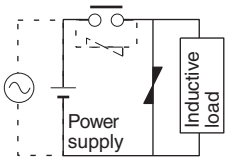
Countermeasures are not required if the frequency of load switching for the whole system with the PLC included is less than 5 times per minute.

Countermeasures are required if the frequency of load switching for the whole system with the PLC included is more than 5 times per minute.

Countermeasure Examples

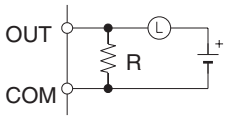
When switching an inductive load, connect an surge protector, diodes, etc., in parallel with the load or contact as shown below.

Circuit	Current		Characteristic	Required element
	AC	DC		
CR method 	Yes	Yes	If the load is a relay or solenoid, there is a time lag between the moment the circuit is opened and the moment the load is reset. If the supply voltage is 24 or 48 V, insert the surge protector in parallel with the load. If the supply voltage is 100 to 200 V, insert the surge protector between the contacts.	The capacitance of the capacitor must be 1 to 0.5 μF per contact current of 1 A and resistance of the resistor must be 0.5 to 1 Ω per contact voltage of 1 V. These values, however, vary with the load and the characteristics of the relay. Decide these values from experiments, and take into consideration that the capacitance suppresses spark discharge when the contacts are separated and the resistance limits the current that flows into the load when the circuit is closed again. The dielectric strength of the capacitor must be 200 to 300 V. If the circuit is an AC circuit, use a capacitor with no polarity.

Circuit	Current		Characteristic	Required element
	AC	DC		
Diode method 	No	Yes	The diode connected in parallel with the load changes energy accumulated by the coil into a current, which then flows into the coil so that the current will be converted into Joule heat by the resistance of the inductive load. This time lag, between the moment the circuit is opened and the moment the load is reset, caused by this method is longer than that caused by the CR method.	The reversed dielectric strength value of the diode must be at least 10 times as large as the circuit voltage value. The forward current of the diode must be the same as or larger than the load current. The reversed dielectric strength value of the diode may be two to three times larger than the supply voltage if the surge protector is applied to electronic circuits with low circuit voltages.
Varistor method 	Yes	Yes	The varistor method prevents the imposition of high voltage between the contacts by using the constant voltage characteristic of the varistor. There is time lag between the moment the circuit is opened and the moment the load is reset. If the supply voltage is 24 or 48 V, insert the varistor in parallel with the load. If the supply voltage is 100 to 200 V, insert the varistor between the contacts.	---

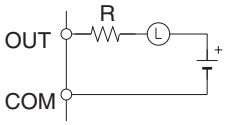
When switching a load with a high inrush current such as an incandescent lamp, suppress the inrush current as shown below.

Countermeasure 1



Providing a dark current of approx. one-third of the rated value through an incandescent lamp

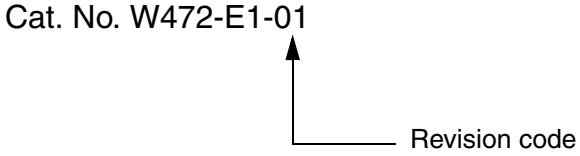
Countermeasure 2



Providing a limiting resistor

Revision History

A manual revision code appears as a suffix to the catalog number on the front cover of the manual.



The following table outlines the changes made to the manual during each revision. Page numbers refer to the previous version.

Revision code	Date	Revised content
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